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# SPONTANEOUS HYPERVENTILATION TETANY

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Tetany as a sequel to overbreathing has been known for some time. The first observations appear to have been made by Haldane and Poulton (1908), who in experiments involving forced breathing noticed that the subjects of the experiments developed tingling in the hands and feet, and certain other symptoms. It was Grant and Goldman (1920), however, who first completely identified with tetany the condition following forced respiration. Shortly afterwards the occurrence of clinical cases of hyperventilation tetany was reported by Barker and Sprunt (1922) and by Goldman (1922).

The causes of overbreathing which may give rise to tetany are numerous. They include certain cerebral conditions which presumably operate by some effect on the respiratory centre, exercise, pain, and nausea. The great majority of cases, however, have little or no recognizable organic background, but occur in those suffering from anxiety states, hysteria, or psychoneuroses, and the patients are for the most part young women.

Diagnosis in most cases is not difficult; there may be a history of disturbance of respiration, or increased rate or depth of respiration may be obvious on examination. Many authors stress the value of making the patient overbreathe and so inducing an attack. This is useful not only as a diagnostic procedure but also in demonstrating to him how, by voluntary effort to check overbreathing, he may ward off attacks. Kerr, Dalton, and Gliebe (1937), Rossier (1939), and others believe that not only typical tetany but many other clinical manifestations may be the result of hyperventilation in patients suffering from anxiety states. They describe cases, and depend largely on a hyperventilation exercise for diagnosis, as they claim that such an exercise causes the patient to reproduce the symptoms complained of.

We have observed five cases of spontaneous hyperventilation tetany. In each of them the serum calcium was determined as a routine measure, and in four the serum inorganic phosphorus also. In three of the latter the phosphorus was in the neighbourhood of 1 mg. per 100 c.cm. of serum. We believe this figure to be much lower than previously reported in this type of case. Moreover, the results in these three cases are so definitely below the normal range as to be of valuable diagnostic significance, and phosphorus determinations should therefore prove a useful addition to the methods of diagnosis already referred to. It is important to note that the specimens of blood for analysis were taken from the patients *immediately after* an attack of tetany.

## Illustrative Cases

*Case 1.*—A nurse aged 19 was first seen on account of pains in the joints that did not respond to salicylates. The blood picture showed no anaemia, but there was a relative lymphocytosis. The serum gave a positive agglutination to *Br. abortus* in a dilution of 1 in 200. The spleen was not palpable. The pains continued for many weeks. On three or four occasions she had attacks starting with pain in the left side of the chest, followed by periods of deep sighing respirations lasting about half an hour, and on two occasions by tetanic spasms. One attack followed a hot bath: the patient felt breathless and began to breathe rapidly and deeply. Cramp-like pains developed in about ten minutes, and finally a typical tetanic spasm of the hands occurred. This gradually passed away, the whole attack lasting twenty to thirty minutes. Blood was taken at the end of the attack, and the serum contained 11 mg. of calcium and 1.3 mg. of inorganic phosphorus per 100 c.cm. A week later, when all such symptoms were absent, the serum contained 10.6 mg. of calcium and 3.8 mg. of inorganic phosphorus.

*Case 2.*—A nurse aged 21 came under observation when suffering from a cold in the head of a rather persistent kind. During the illness she had attacks of a type similar to those experienced by the previous patient; they started with pain in the chest, followed by deep sighing respirations and then by typical tetanic spasms. Just after one attack the serum contained 11 mg. of calcium and 1 mg. of phosphorus. Some time afterwards, when the patient was quite free from symptoms, the calcium was 10.6 mg. and the phosphorus 3.6 mg.

*Case 3.*—A married woman aged 24 complained of loss of weight, palpitation, and nervousness. There was a history of fainting attacks occurring at intervals during the previous two years, and in the past fourteen months she had had attacks beginning with stiffness of the left side, constriction of the throat, and difficulty in breathing, followed by tremors and tetanic spasms of the hands and feet. These attacks lasted about twenty minutes. She had an enlarged thyroid and was considered to be suffering from thyrotoxicosis secondary to diffuse simple goitre. There was a remarkable family history: her mother and three brothers had enlarged thyroids and a sister had undergone thyroidectomy. She was treated by *x* rays and later admitted as an in-patient. In hospital a typical attack of tetany occurred in the early morning. She believed it was caused by the screaming of another patient in the ward, and said that such attacks were more likely to occur when she was upset. Since then she has had two minor and less typical attacks; after one of these the serum calcium was 11.2 mg. and the phosphorus 2.1 mg. At a time when she was free from attacks the calcium was 10.4 mg. and the phosphorus 4 mg., and on another occasion the calcium was 10.7 mg. and the phosphorus 3.6 mg.

*Case 4.*—A married woman aged 23 was described by the house-physician as "a woman of healthy appearance and many complaints." She was an only child. She had had spasmodic dysmenorrhoea before and after marriage and after pregnancy. Attacks of sickness and dizziness had occurred over many years, and three years before admission she had a "nervous breakdown." During the past nine months she had had fainting attacks, with spasms of arms and hands and sometimes cramps in the feet. Examination revealed no abnormal physical signs. While in hospital she had two or three attacks of fainting, one of them followed by well-

marked tetanic spasm, which was immediately relieved by intravenous calcium gluconate. Another attack began with fainting, and on recovery the patient found it difficult to get her breath; her arms and trunk felt numb, stiff, and quite powerless. At the end of this attack the serum contained 11.1 mg. of calcium.

*Case 5.*—An unmarried female typist aged 29 was admitted with over four years' history of attacks of unconsciousness. These are said to last for three hours. She always falls on the back of her head, but is never seriously hurt; the tongue is never bitten and there is no incontinence. She has also experienced another kind of attack, which invariably follows exercise but occurs sometimes when she is at rest. She breathes deeply, sobs, and develops a tremor; her limbs feel cold, her hands and legs become stiff, and her thumbs are drawn into her palms. Following these attacks, which last about fifteen minutes, she experiences a tingling sensation all over her body and face. In this case the serum calcium was 12.8 mg. and the phosphorus 1 mg.

### Precipitating Factors

In the first three of these cases attacks of tetany occurred during the course of another illness, which may well have been a contributing factor in the production of the tetany or a precipitating cause of the attacks. Hyperventilation is not an uncommon response to pain, and pains in the joints were the outstanding complaint in Case 1. It is also interesting to note that one attack followed a hot bath, which is a well-known cause of hyperpnoea. In Case 2 the feeling of difficulty in breathing consequent on the cold in the head would act as a stimulus to increased respiratory effort, leading to hyperventilation. In Case 3 the increased respiration rate due to thyrotoxicosis was probably a factor, reinforced at times when the patient was "upset" by the hyperventilation which commonly results from mental distress in many individuals. In Cases 4 and 5 spasmodic attacks were the major complaint. Both patients were obviously of neurotic type—one "full of complaints," the other giving a history of fairly typical hysterical fits.

It has been noticed in some of the reported cases that tetany has been initiated very easily by overbreathing and that occasionally the overbreathing is barely noticeable. Barnes and Greaves (1936) consider that the period of overbreathing required to produce tetany in all cases occurring clinically is greatly reduced compared with that required in normal people. This, however, is not true. In Case 2 of Kerr, Dalton, and Gliebe's series, for example, the period of overbreathing before tetanic spasms occurred was twenty-three minutes. Schultzer and Lebel (1939), while recognizing that patients of the "nervous" type are often oversensitive to hyperventilation, divide clinical cases of spontaneous hyperventilation tetany into two types—namely, those who behave like normal individuals to hyperventilation, requiring vigorous forced breathing usually for a period of fifteen or more minutes before tetany supervenes, and those who get tetany after comparatively mild hyperventilation. They describe one case of each type.

We have no doubt that variations in sensitivity to hyperventilation do exist, and these variations are probably important factors in determining the liability to tetanic attacks and the ease with which they are produced. But we are not inclined to agree with the division of cases into two clear-cut groups from this point of view. One factor involved in this sensitivity will be the condition of the patient before obvious hyperventilation occurs. In certain individuals hyperventilation is a frequent and unconscious response to relatively mild emotional stimuli, change of mood, pain, fatigue, etc. Such persons are often in a state of hyperventilation which may not easily be recognized, but which may have already initiated the process that ultimately causes tetany, so that relatively little further hyperventilation is needed to complete the process. Schultzer and Lebel suggest that the "oversensitive" patient described by them was constantly in a state of latent tetany and thus would require little further stimulus to evoke a frank attack.

Probably the most important factor in the production of spontaneous hyperventilation tetany is the type of reaction to a variety of stimuli. Some persons may hyperventilate very little or not at all to the usual stimuli and thus will have scarcely any liability to attacks of tetany; at the other extreme are those who hyperventilate readily on the slightest provocation. Our own cases illustrate two grades of response—the first to definite physical stimuli, and the second to stimuli which are apparently temperamental or emotional in origin.

### Calcium and Phosphorus Levels

The serum calcium in four of our cases was at a high normal level, while in the fifth it definitely exceeded the normal. In the three cases in which blood was examined in periods when the patients were free from attacks the figures were below those obtained just after an attack. Some authors find a slight rise in serum calcium in this type of case. Others say that the calcium is either normal or slightly raised, while others find it unchanged.

As already noted, the serum inorganic phosphorus in three of our cases was in the neighbourhood of 1 mg., while in the remaining case in which the determination was made it was 2.1 mg. In the three cases in which the serum phosphorus was determined in attack-free periods the figures obtained were between 3 and 4 mg.; one of these was the case showing 2.1 mg. immediately after an attack. Many authors omit any mention of the serum inorganic phosphorus in their cases. Where mention is made the figure is generally found to be between 2 and 3 mg. Barnes and Greaves, however, obtained figures exceeding 3 mg., and their values before and during tetany were approximately the same. (The majority of figures for normal adults lie between 3 and 4 mg.)

Where blood has been analysed in reported cases the specimens have been taken *during* the tetanic attack, and quite often during the early part of it. The fact that in our cases the specimens have been taken *immediately after* an attack accounts, we think, for the greater departures from the normal that we have observed. In this connexion the work of Haldane, Wigglesworth, and Woodrow (1924) appears to be of considerable importance. One of them kept up forced breathing for periods varying from one to one and a half hours on four occasions. Carpal spasm was present throughout most of these periods, and Chvostek's and Trousseau's signs throughout the whole of them. On every occasion the inorganic phosphorus of the blood fell below 1.25 mg. per 100 c.cm. In addition to the fall in blood phosphorus there was also a marked drop in urinary phosphate excretion: the curves for blood and urine phosphorus were parallel. The very low phosphorus excretion continued beyond the end of the period of forced breathing, and the lowest blood phosphorus was obtained in the latter half of this period. The blood phosphorus figure soon after the end of the period was not ascertained, but from the form of the urine curve it seems very probable that such a figure would also be low, corresponding closely to that found immediately after periods of clinical tetany. No mention of the blood calcium is made by Haldane *et al.*, but it seems quite probable that the maximum change here is also near the end of the period. If so, it would explain our own findings and the variable results reported by other authors, since there has apparently been no uniformity in the time at which blood has been taken by them with reference to the tetanic attacks.

As already pointed out the very low phosphorus figures we have obtained should prove useful evidence in diagnosis, particularly in otherwise difficult cases; where the actual phosphorus figure is only moderately reduced a comparison between it and the figure obtained in attack-free periods should serve a similar purpose. The low figures are also of some importance in demonstrating another similarity between spontaneous hyperventilation tetany and experimental tetany produced by deliberate overbreathing.

### Alkalosis and Anoxia

Tetany following hyperventilation is generally believed to be due to an alkalosis resulting from the washing out of carbon dioxide from the blood brought about by overbreathing; there is thus a disturbance of the ratio $H_2CO_3 : NaHCO_3$, on which the acid–base equilibrium of the blood largely depends. In an attempt to bring tetany due to alkalosis into line with low-calcium tetany it has been claimed that the alkalosis, although leaving the total calcium of the blood unaltered, causes the ionized fraction of it to be reduced. Thus all forms of tetany are explained as the result of a fall in the ionized calcium of the blood. There is, however, opposition to the view that in hyperventilation tetany a reduction of ionized calcium occurs. McCance and Watchorn (1937), for example, found that in a normal person and in a patient subject to spontaneous attacks the "ultrafilterable" calcium of the blood was slightly increased during attacks of tetany induced by voluntary overbreathing. Schultzer and Lebel determined the ionized calcium of the blood in the cases already referred to, and found it practically unaltered during the attacks. Moreover, in one of these cases they increased the ionized calcium by injecting 10 c.cm. of a 10% calcium chloride solution intravenously, and then got the patient to overbreathe. Tetany set in just as on previous occasions, and during the attack both the total and the ionized calcium were higher than when no calcium chloride had been given. A review of all the evidence leads to the conclusion that reduction of the ionized calcium of the blood during hyperventilation tetany has not been proved.

In addition to alkalosis, anoxia is also believed by some to be a factor of importance. Kerr, Dalton, and Gliebe quote evidence to show that alkalization of capillaries by local application will cause constriction, while carbon dioxide will dilate the capillary bed; and Rossier draws attention to the change in the dissociation curve of oxyhaemoglobin in alkalosis, which has the effect of making oxygen more tightly bound to haemoglobin and therefore less readily given up to the tissues.

Not all observers, however, accept alkalosis as the basis of the spontaneous tetanic attack; some believe it to be due to the direct effect of hyperventilation on the central nervous system. We consider the marked similarities in the chemical findings in spontaneous hyperventilation tetany and in tetany experimentally induced by voluntary overbreathing, in which there is little doubt that alkalosis is produced, to be against this view. The repeated observations that spontaneous attacks can quickly be terminated by causing the patient to breathe air enriched with carbon dioxide show that carbon dioxide deficit is an essential factor in the production of the attack; and carbon dioxide deficit is a sufficient cause of alkalosis.

Yet when alkalosis is admitted there is controversy as to whether it acts on the central nervous system or more directly on the tissues. It is well known that changes in the ratio $H_2CO_3 : NaHCO_3$ in the blood are met by attempts at adjustment. Adjustment for reduction of blood $CO_2$ requires reduction of $NaHCO_3$ to maintain the ratio at a constant level. Such reduction is seen in the elimination of some $NaHCO_3$ through the kidneys, but this process is not fast enough to prevent some of the $NaHCO_3$ from being deposited in the tissues. The fall in blood phosphate simultaneously with a great diminution of phosphate excretion in the urine during periods of hyperpnoea shows that phosphate also must pass into the tissues. It is therefore reasonable to assume that a tissue alkalosis exists which alone, or in combination with the anoxia already referred to, is responsible for the tetanic symptoms. Another consideration which favours this view is the fact that some, at any rate, of the blood changes resulting from overventilation are found to be greatest at the end of the tetanic attack. This we have shown to be the case with regard to the inorganic phosphorus, and probably of the calcium also. Yet it is seen when attacks have terminated spontaneously. If the tetany were caused by the effect of changes in the blood acting on the central nervous system it is rather difficult to understand why that action should cease when the changes are at their maximum. The difficulty disappears, however, if we assume that tissue alkalosis is the chief factor involved; for the alkalosis which causes the tetany is neutralized by its result—namely, acid metabolites produced as an outcome of the muscular spasms. The attack is thus brought to an end while the blood changes are still in evidence; reversal of the blood changes then follows.

### Probable Explanation of Hyperventilation Tetany

The most probable explanation of spontaneous hyperventilation tetany therefore appears to us to be as follows:

As a result of certain stimuli—physical in some cases, emotional in others—some individuals respond by overbreathing. If this is sufficient to cause a reduction of the concentration of carbon dioxide in the blood alkalosis will follow, and this in its turn may be sufficient to cause an attack of tetany. The attack is mainly due to tissue alkalosis and comes to an end spontaneously, largely as a result of the tendency to tissue acidosis consequent on the muscular activity of the tetany itself. Cessation of overbreathing also occurs, and quickly assists in the return to normal conditions. The principal factor involved is the tendency to overbreathe. This tendency appears to be greatest in those of emotionally unstable temperament, sufferers from anxiety neuroses, etc. In these and others the tendency may be influenced by physical factors. Other factors which probably play some part are the state of the acid–base equilibrium when the overbreathing takes place and the susceptibility of the subject to alkalosis and its effects.

We should here like to make some reference to conditions other than tetany which have been associated with hyperventilation. Many of these are referred to by Kerr, Dalton, and Gliebe. Sargant (1940) has drawn attention to the part played by hyperventilation in conditions mostly described under the terms "neurocirculatory asthenia" and "effort syndrome." While it is possible that there may be other causes of the symptoms complained of in these conditions, there is clear evidence that carbon dioxide deficit is the determining factor in those cases associated with spontaneous hyperventilation. Soley and Shock (1938) investigated seven cases of effort syndrome, and showed that respiratory alkalosis was responsible for the symptoms of this condition.

It seems clear, therefore, that alkalosis resulting from spontaneous hyperventilation may cause either tetany or the conditions just referred to, but what determines the actual clinical manifestations in any given case is not apparent. Certain facts, however, seem to be of importance. First, effort syndrome and related conditions, without tetany, are rarely, if ever, seen as a result of voluntary overbreathing in normal individuals. Secondly,

in spontaneous tetany resulting from hyperventilation, and to a much less extent in the tetany induced by voluntary overbreathing in normal people, many of the symptoms associated with effort syndrome, etc.—breathlessness, dizziness, faintness, palpitation, tremor—are also present, but tend to be overshadowed by the tetanic spasms. Thirdly, in most cases of spontaneous hyperventilation tetany and in all reported cases of effort syndrome, etc., there is a background of anxiety, emotional stress, or other psychological disturbance.

### Conclusions

Two conclusions of importance appear to follow. The first is that the clinical manifestations which may arise from hyperventilation cover a much wider field than is comprised by the term "tetany"; there is much justification for the use of the recently introduced term "hyperventilation syndrome" to include all these manifestations. Of this syndrome tetany is only a component, though the most striking one, particularly when the syndrome appears in normal persons. The second conclusion is that the altered reaction to overbreathing of certain patients as compared with normal individuals is due to the altered psychological state.

This altered reaction might be accounted for in various ways. Thus the changes brought about by overbreathing might fall short of what is required to produce tetanic spasms, so that attention is concentrated on the other components of the syndrome which appear. In the case of effort syndrome which Soley and Shock describe at length voluntary overbreathing caused the appearance of frank tetany immediately following the development of the symptoms originally complained of. A similar result was found in some of Kerr, Dalton, and Gliebe's cases. In others, however, tetany failed to appear at all. These might be explained on the assumption that tetanic spasm is inhibited or suppressed while other components develop more or less completely. In more general terms, it may be assumed that there is an alteration of sensitivity of various tissues to the effects of alkalosis, so that, while in normal individuals and in many patients the principal manifestations are shown in the voluntary musculature, in some patients they are shown in the circulatory system, in others in the respiratory system, and so on.

We have not so far had the opportunity of investigating cases showing the hyperventilation syndrome without tetany, and we do not know if these cases produce the same changes in the blood phosphorus and calcium as in those we have reported. Information on this point, however, would be of interest, and, if these changes do occur, of value in diagnosis. Effort syndrome, for example, is, according to Soley and Shock, probably the commonest source of error in the differential diagnosis of organic cardiac disease. Additional help in the diagnosis of this and related conditions would therefore be welcome.

### Summary

Five cases of spontaneous hyperventilation tetany, all occurring in young women, are described. In three the tetanic attacks occurred during the course of another illness, while spasmodic attacks were the major complaint in the remaining two.

In blood specimens taken immediately after a tetanic attack the calcium was found to be at a high normal level in four cases and above normal limits in the fifth. In the three cases in which blood calcium was determined in symptom-free periods it was definitely lower than just after the tetanic attack. The inorganic phosphorus of the blood immediately following an attack was in the neighbourhood of 1 mg. in three cases and 2.1 mg. in the other case in which it was determined. In the three cases in which it was determined in symptom-free periods the figures were between 3 and 4 mg. This great fall in blood phosphorus has not previously been reported in clinical cases, but has been seen in experimental tetany induced by voluntary overbreathing.

The causes of spontaneous hyperventilation tetany have been discussed. Attention has been drawn to the tendency to hyperventilate in persons suffering from anxiety states, and to the tissue alkalosis which results from hyperventilation and which is considered to be the principal factor in bringing on the tetanic attack.

Reference is made to other clinical manifestations associated with hyperventilation, especially effort syndrome and related conditions.

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## THE INSULIN TREATMENT OF PULMONARY TUBERCULOSIS

BY

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In the days before there were such things as artificial pneumothoraces and thoracoplasties a great deal of attention was paid to the dietetic treatment of pulmonary tuberculosis. Patients were encouraged to eat heavily at meals and to drink lots of milk in their spare time in the belief that increase in body weight promoted healing. With the advent of surgical procedures dietetic treatment tended to be overlooked or, at any rate, to be pushed into the background. It became the fashion to feed patients on an ordinary full and attractive diet and to regard increase in body weight as an encouraging sign of improvement in local lesions, the credit being given to whatever adjuvant treatment was being employed. Indeed, in one of the latest publications on the subject (Pearson and Day, 1937) the authors had not emerged from this way of thinking, in spite of evidence to the contrary that was accumulating. They advocated an ordinary full diet such as might be given to a boat-race crew in training, although two cases were recorded in which insulin and a high carbohydrate diet had been employed with most promising results. It was the account given by Himsworth (1938) of the gratifying manner in which the diabetic consumptive responded to a high carbohydrate diet together with insulin in excess of his diabetic requirement that encouraged us to try exactly the same regime on consumptives who had not got diabetes. During the past three years we have been feeding an increasing number of our patients on a high carbohydrate diet and rendering their blood sugar low by repeated hyperinsulination. The results suggest the need for a further reshuffling of the cart and horse. Improvement in healing may after all sometimes be the result of regained body weight and not the cause. It certainly appears that improvement can be brought about by forced and "unnatural" feeding.

### Technique

The patient receives five injections of insulin, each of 10 to 15 units, during the twenty-four hours. Three of them are given half an hour before the main meals—breakfast, lunch, and dinner—the other two in the middle

of the morning and the middle of the afternoon, and they are accompanied by a fruit drink containing 3 oz. of cane- or grape-sugar. An ordinary standard diet requires very little alteration to turn it into a high-carbohydrate–low-fat diet. At breakfast, porridge or cereals must be taken as well as plenty of toast and marmalade; at lunch and dinner, soups are thickened with flour, puddings with high carbohydrate content are prescribed, and the patient is encouraged to round off these meals with cheese and biscuits—especially the biscuits—to make sure. The patient has a fruit drink always at his bedside to ward off any untimely attack of hypoglycaemia; if ambulant he carries barley-sugar sweets in his pocket. It is interesting to note that without insulin this modification in the diet makes no alteration to the course of the body weight. With insulin the effect is really rather staggering.

As the patient's blood sugar becomes lowered during the half-hour before meals, so he develops an appetite—quite often a craving for food—and a larger meal is eaten than he is accustomed to. But that does not account for the whole phenomenon, because with only three injections a day before meals there is very little effect on the body weight. The part played by the mid-meals injection and the fruit drink is difficult to understand in theory, but in practice it appears necessary for increasing the body weight. Nor does it work so well if the patient has the daily 50 or 60 units split into three pre-prandial injections. In fact, it seems—regrettably—the more injections the better, and in some cases we persuade a patient to have another 10 units, with a fruit drink at bedtime.

The induced hypoglycaemia affects patients in different ways. Some notice nothing amiss throughout the treatment, and one is tempted (sometimes quite successfully) to increase their units, or the time interval between injection and meal, until they do; for both these are elastic and should be adjusted to suit the individual case. The right dosage nicely timed should produce a mild sinking feeling and a readiness—nay, an eagerness—for food. This condition, if the patients are left unfed, develops into what they have christened "the jitters." They feel tense, their limbs tremble, their heart palpitates, their forehead bursts into a cold sweat, and they become anxious. Very rarely the emotional upset predominates. The patient may feel an urgent desire to howl and to throw things about, and yet realizes the while how idiotic such behaviour is. This condition occurs only at night, and for that reason we rarely give the night-cap dose, which apparently excites it. Two of our patients have developed transient fugue states wherein they have eaten their dinner and conversed with the nurses in a dream state—and have even apparently read their paper. Later they return to consciousness and can remember nothing after a certain moment when the "black-out" began. Both patients did this only at dinner-time, and it was prevented thereafter by reducing the relevant dose of insulin.

The only other untoward effect we have to record is that in some patients the skin becomes sensitized to insulin injections and develops urticaria, first at the site of subsequent injections and later at the site of all previous injections. This is a transient condition, cured as a rule by changing the brand of insulin used. In extreme cases the skin may have to be desensitized by minute doses as in protein desensitization.

## Results

Selection of subjects for this form of treatment has always been fortuitous. No regard has been paid to the nature or the extent of their disease or to the presence or absence of pyrexia. Their only common factor was that on an ordinary diet they persistently lost weight or remained gloomily constant at a weight well below that appropriate for their size. Except for this last circumstance it would seem perfectly fair to compare their average progress with that of the average of all the other sanatorium patients not so treated; but it must be remembered, when such comparison is made, that the average control patients are gaining in body weight on an ordinary diet, and that the subjects were losing, and thus had the dice loaded against them. During the past three years the average increase in body weight of the controls has been 1¼ lb. per month (four weeks) per patient. The range of variation is from 1/2 to 3 lb. per month, due partly to seasonal and climatic influences, but more largely to the variation in the personnel. New patients almost invariably gain weight prodigiously for their first few weeks, so that a month in which many new patients are admitted has an exalted average. On the other hand, a large number of fit ambulant patients on the eve of departure will be reducing their superfluous flesh by increasing exercise and thus lowering the average gain for the time being.

Table I needs very little explanation. It includes every patient who has undergone this special form of treatment.

TABLE I.—*Average Cumulative Gain in Body Weight*

| Case No. | Before Treatment | | Zero | During Treatment | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2 m. | 1 m. | 0 | 1 m. | 2 m. | 3 m. | 4 m. | 5 m. | 6 m. | 7 m. |
| | lb. | lb. | st. lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. |
| 1031A | | −1½ | 6 4½ | 2 | 10½ | 11¾ | 15½ | | | |
| 1031B | 2 | 0 | 7 4¾ | 3 | 6½ | 10½ | | | | |
| 1031C | | | 7 10¾ | −½ | −¾ | −1¼ | | | | |
| 1031D | | | 6 10¼ | 7½ | 10¾ | 13¼ | 14¾ | 18¼ | 20¾ | 22 |
| 1429 | 4½ | 1½ | 8 9 | 4¾ | 4 | 6 | 5¼ | | | |
| 1435 | 6½ | 3¼ | 7 12½ | 3½ | | | | | | |
| 1442 | 1¾ | 1½ | 5 12½ | 5½ | 9½ | 14 | 15½ | | | |
| 1447 | 4 | 1 | 9 9½ | 7 | 14½ | 13½ | | | | |
| 1478A | 0 | 2½ | 6 10½ | 6½ | 7 | 14½ | 21¾ | 25 | 27¾ | 35½ |
| 1478B | 2½ | 1¼ | 8 8 | 8¼ | 13½ | 15¾ | 20 | | | |
| 1478C | | 2 | 9 3½ | 1 | −½ | 1¼ | 4 | 3¾ | 6 | 8 |
| 1478D | | | 8 6¾ | ½ | | | | | | |
| 1528 | 10 | 4 | 7 4 | 6 | 9 | 10½ | 11¼ | 12½ | | |
| 1535 | 6½ | 2 | 8 1½ | 3½ | 8¾ | | | | | |
| 1570A | 9¾ | 3¾ | 8 13 | 4½ | 7¾ | 12¾ | 16 | 17¼ | 21¼ | 23½ |
| 1570B | | | 9 3 | 1½ | 10¼ | | | | | |
| 1636 | | 1½ | 8 3 | 7½ | | | | | | |
| 1638 | 0 | 1½ | 11 5 | 5¼ | | | | | | |
| 1644 | 1¼ | ½ | 9 7¼ | 5 | | | | | | |
| 1661 | | 4 | 10 2½ | 1½ | 4¼ | | | | | |
| 1673A | −1 | 1 | 7 1¾ | 9½ | | | | | | |
| 1673B | | 2½ | 7 7¼ | 3¾ | | | | | | |
| 1706 | ¼ | −¾ | 8 4 | 5½ | 7 | | | | | |
| 1788 | | | 10 7¼ | 16 | 21¾ | 22½ | 27 | 32 | 38½ | 46½ |
| 1796 | | −2½ | 7 2¾ | 6¼ | 4¾ | | | | | |
| 1835 | | | 7 1½ | 5 | 7½ | | | | | |
| 1865 | | −2¼ | 7 2 | 9½ | 12½ | | | | | |
| Aggregate gain | 47¼ | 26½ | | 138¾ | 167¾ | 144½ | 151½ | 108¾ | 114¼ | 135 |
| No. under treatment .. | 14 | 21 | | 27 | 20 | 13 | 10 | 6 | 5 | 5 |
| Average for month .. | 3.37 | 1.26 | | 5.14 | 8.38 | 11.11 | 15.15 | 18.12 | 22.93 | 27.0 |

Although all these subjects began and ended their course of treatment at different periods during three years (thus largely eliminating seasonal and other influences), the time-datum line has been adjusted so that they appear to be starting their treatment simultaneously.

The weights in the zero column are those recorded immediately before the beginning of treatment; to the left are the monthly differences for the preceding eight weeks, and to the right the monthly differences during treatment. It will be noted that most of the patients were slowly but steadily losing weight before treatment began, and that they at once started to gain weight rapidly. At the foot of each column is the average cumulative gain or less shown by the patients under treatment at the end of that particular month. Their number diminishes from month to month for various reasons. Only five times has the

treatment lasted more than six months. Where a patient has had more than one course of this treatment his progress on each occasion has been entered separately—for example, Case 1478 A, B, C, and D.

There are one or two points to be noted in this table: first, that in most cases the greatest gain is that recorded at the end of the first month—the record being 16 lb. (No. 1788); secondly, that one or two cases show no gain worth mentioning at all at the end of the first month, but make up for it later on—for example, Nos. 1478 C, 1570 B, and 1031 A. The moral of the latter is: Don't be discouraged if this form of therapy seems to have no immediate effect, but persevere and slightly increase the insulin dosage (as was done in these laggard cases).

These averages I have plotted in graph form (Fig. 1), and to say that they compare very favourably with the curve shown by the average control would be an understatement. The treated patient during the first seven months gains on an average 3.86 lb. per month as against the control's 1.3 lb.—almost three times as much.

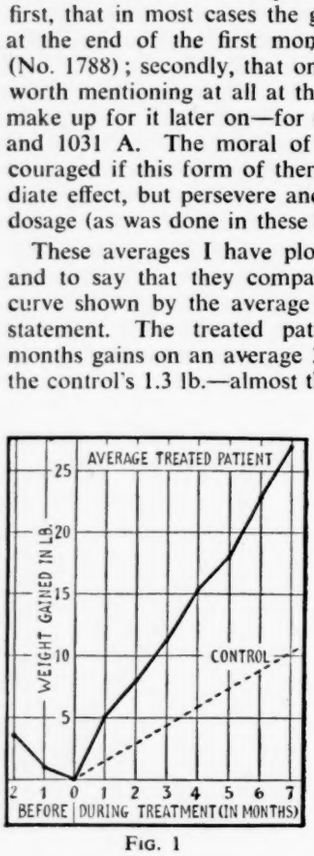


FIG. 1

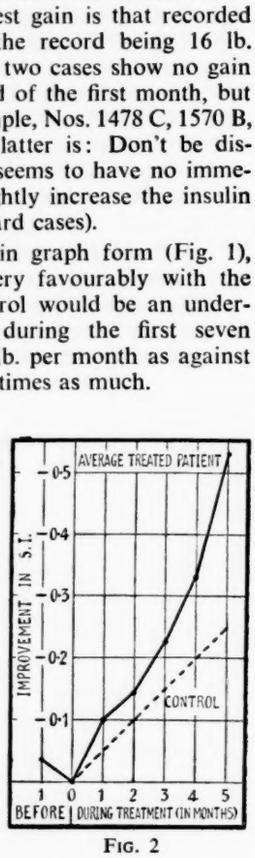


FIG. 2

FIG. 1.—Graph showing increase in weight of the average treated patient compared with that of the average control.

FIG. 2.—Graph showing increase in sedimentin index of the average treated patient compared with that of the average control.

### Theory of Symbiotic Equilibrium

The question will be asked, "Are these patients any better off for having gained this prodigious amount of body weight in so short a space of time?" A moment's reflection will show how difficult it is to answer this question at all. The criteria of improvement are, categorically, cessation of pyrexia, diminution and disinfection of sputum, improvement in radiological appearances, improvement in blood stability, and—blessed generalization—improvement in general condition. And here I should like to introduce the term "symbiotic," complete with definition. A "symbiotic" is a patient who is living in a state of armistice with his bacilli. He may have large infected cavities which produce quantities of heavily infected sputum, but for the time being the disease process seems limited to these frontiers; he is apyrexial, ambulant—in fact, he may be employed at a full-time job; his general condition is good and his blood stability is high. He may maintain this symbiotic equilibrium for months or even years. True, the sword of Damocles hangs over his head, but the thread is unfrayed and for the moment his tubercle bacilli are of no more importance to him than his smegma bacilli.

The answer to this question is that insulin therapy will neither heal nor disinfect cavities, but it seems to assist the transformation of a patient with active and progressive disease into a symbiotic. That being achieved, surgical procedures to obliterate cavities can be undertaken which would have been impossible during the progressive stage of the disease. Some of our most exciting cases are those of patients who, admitted as "dead-beats" and apparently hopeless, have improved sufficiently in their general and local conditions for artificial pneumothorax or even thoracoplasty to be successfully performed.

### The Sedimentin Index

By what yardstick can this improvement be measured and compared with the progress of our controls? Both Houghton's index and Medlar's index I find are excellent in their way, but they involve a lifetime of differential blood counts and give in return a very arbitrary figure which is not a measurement of anything in particular. I have a similar objection to the blood sedimentation rate expressed in millimetres fallen by the end of the first hour: it is not a direct measure of anything.

The sedimentin index (Day, 1940), on the other hand, derived from the logarithm of the corpuscles' maximum velocity, gives a definite measurement of those products of tissue destruction present in the blood plasma that cause increased rate of erythrocyte sedimentation—albeit in arbitrary units. For the purposes of this investigation I have chosen in default of any better measurement the monthly sedimentin indices of the subjects and their controls as measurements of improvement or deterioration in their condition.

In Table II I have set out the subjects' sedimentin indices exactly as I have set out their weights in Table I. The

TABLE II.—*Average Improvement in Sedimentin Index*

| Case No. | Before Treatment | Zero | During Treatment | | | | |
|---|---|---|---|---|---|---|---|
| | 1 m. | 0 | 1 m. | 2 m. | 3 m. | 4 m. | 5 m. |
| 1031A | 0.00 | 1.96 | −0.14 | −0.21 | −0.14 | −0.04 | |
| 1031B | +0.02 | 1.88 | −0.03 | −0.18 | −0.43 | | |
| 1031C | 0.00 | 1.82 | 0.00 | +0.03 | +0.06 | −0.07 | |
| 1031D | 0.00 | 2.00 | −0.23 | −0.13 | −0.50 | −0.58 | −0.60 |
| 1429 | 0.00 | 1.92 | 0.00 | 0.00 | 0.00 | | |
| 1442 | +0.03 | 1.97 | −0.05 | −0.07 | −0.05 | | |
| 1447 | 0.00 | 1.47 | −0.12 | +0.03 | 0.00 | −0.19 | |
| 1478A | −0.18 | 2.25 | 0.00 | 0.00 | +0.02 | −0.15 | −0.34 |
| 1478B | −0.03 | 2.03 | −0.13 | −0.03 | −0.18 | −0.13 | |
| 1478C | +0.09 | 1.76 | −0.10 | −0.05 | −0.10 | −0.10 | |
| 1570A | +0.05 | 2.30 | −0.10 | −0.37 | −0.41 | −0.48 | |
| 1570B | +0.15 | 2.20 | −0.31 | −0.38 | | | |
| 1598 | +0.17 | 2.03 | −0.03 | −0.03 | −0.33 | −0.48 | −0.58 |
| 1638 | +0.02 | 2.03 | −0.03 | −0.10 | | | |
| 1661 | +0.13 | 1.15 | −0.15 | −0.30 | −0.55 | | |
| 1673 | −0.15 | 2.35 | −0.28 | −0.35 | −0.59 | −0.50 | −0.59 |
| 1706 | +0.10 | 1.92 | +0.03 | −0.02 | | | |
| 1756 | +0.27 | 2.20 | +0.22 | +0.15 | +0.15 | −0.25 | |
| 1788 | 0.00 | 1.94 | −0.44 | −0.66 | −0.44 | −0.82 | |
| Aggregate improvement .. .. | +0.67 | | −1.89 | −2.67 | −3.64 | −3.79 | −2.11 |
| No. under treatment | 19 | | 19 | 19 | 16 | 12 | 4 |
| Average for month .. | +0.037 | | −0.099 | −0.140 | −0.227 | −0.316 | −0.527 |

zero column contains their sedimentin index immediately before the treatment started; to the left are given the differences between it and the one noted four weeks earlier, and to the right the gain or loss month by month. The average improvement of the controls throughout the sanatorium is found to be 0.05 unit per month. Before the treatment began subjects were, on an average, deteriorating at the rate of 0.037 unit per month. During treatment the average improvement was 0.105 unit per month.

In Fig. 2 I have plotted these gains month by month against the gain of the average control.

### Discussion

The question arises, How long should this treatment continue, and how long does it remain effective? I don't

know. As you see, we start with twenty-seven cases and rapidly drop month by month until at the end of seven months there are only five survivors. Patients tire of being prodded five times a day, and they get positively rebellious when their clothes won't meet in front. I'm afraid my practice is to promise: "This nuisance shall stop when you have gained another 7, 9, 12—or whatever it is—pounds." More often than not I have to keep my word when this is accomplished, and have to be satisfied if they retain that weight subsequently. Of course, those who proceed to lose it—and they never lose it as fast as they gained it—are coaxed to undergo another course. Realizing the possible significance of loss of weight, they are not reluctant.

Incidentally, there was one other respect in which the treated patients differed from the controls: none of them had extra milk. They simply had no time to fit it in.

### Summary

The relation between variation in body weight and progress in cases of pulmonary tuberculosis is discussed.

The technique of administering insulin with a high carbohydrate diet is fully described.

Analysis of the results of this regime is found to compare favourably with controls regarding (*a*) increase of body weight and (*b*) improvement in the sedimentin index.

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## LEAD ENCEPHALOPATHY SIMULATING CEREBRAL TUMOUR

BY

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AND

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The present expansion in employment is likely to lead to some increase of industrial hazards to the workers. A case of lead poisoning exemplifying this came recently under our care, and because it simulated closely a cerebral tumour we thought it worth while recording.

### Case History

A man aged 41 was for the last two and a half years employed in an arms factory as a range cleaner. His work involved collecting spent bullets from lead dust and sand into which they had been fired during practice. The amount of lead collected varied, but was usually as much as half a ton every night. The atmosphere would become thick with lead dust, and the only precaution against this was a gauze mask which fitted over his mouth on a wire frame. This by no means prevented the lead dust from reaching his mouth, as when he had finished work he would have a thick black layer on his lips and tongue. He used no gloves while working, but always washed his hands carefully before meals, and also made a habit of washing out his mouth. His firm supplied him with one pint of milk daily, which he consumed on the premises. He apparently remained fairly well until July, 1939, when he had a fit and became unconscious for a quarter of an hour. He was subsequently ill and had to stay away from work for a week, the condition being labelled by his panel doctor as one of influenza. It was noticed afterwards that he became irritable and that his memory was failing; he began to have severe frontal headaches and diplopia on looking to the right. He never experienced abdominal pain, but was troubled with a good deal of cough and expectoration. On September 22 he had another fit, following which he remained somewhat comatose until his admission to Selly Oak Hospital on October 6. The patient has no clear recollection of that period, but remembers that his left arm and leg were twitching and that all this time he had severe headaches and profuse vomiting.

The range cleaners at the factory work in pairs, and we have since heard that the man who helped our patient was taken ill with abdominal pain a week after admission of his workmate.

*Condition on Admission.*—The patient was very restless and confused, and was vomiting continually. He was emaciated, and had a well-marked blue line on the gum margins. Examination of the nervous system showed the following: palsy of the right external rectus muscle and marked bilateral blurring of the disks. There was slight left facial weakness and disinclination to use the left arm and leg, but these limbs were not actually paralysed. It was difficult to decide whether this was due to some increase of tone on that side or to actual weakness. All deep reflexes were obtained with the exception of the left knee-jerk. Both sets of abdominal reflexes were present and equal, and the plantars were flexor. Astereognosis, wrist-drop, or foot-drop was not detected. Nothing abnormal was found in the heart, lungs, abdomen, and ears. The blood pressure was 120/70; neither blood nor albumin was present in the urine.

#### PROGRESS AND FINDINGS

Following admission he became even worse, being very restless, mentally confused, and abusive. He had delusions of being robbed and poisoned, and cried without any reason. On October 10 another fit occurred, in which convulsions were generalized, and he was unconscious for a short time. There was no incontinence, and he did not bite his tongue. A lumbar puncture was done on that day, and the C.S.F. pressure was found to be 350 mm. of water. Twelve c.cm. was drawn off, and gave the following analysis: protein, 160 mg. per 100 c.cm.; globulin +; chlorides, 714 mg. per 100 c.cm.; and a definite trace of lead. A blood count on October 9 showed haemoglobin, 70%; R.B.C., 3,660,000; and leucocytes, 11,400. Marked punctate basophilia was present. The twenty-four-hour urine on October 11 contained 1.16 mg. of lead, which is nearly ten times the highest accepted normal level. The blood urea was 60 mg. per 100 c.cm. The Wassermann reaction was negative.

The patient was kept on a milk diet and given sedatives. During the first few days he had three intravenous injections of 10 c.cm. of 10% calcium gluconate. After two weeks there was a decided improvement, and a twenty-four-hour specimen of urine was found to contain only 0.27 mg. of lead. Ten days later the urinary excretion of lead had dropped to the normal figure of 0.12 mg. Ammonium chloride, 15 grammes thrice daily, was then tentatively tried for a fortnight, but no rise in the excretion of lead was obtained, possibly owing to the fact that the dose was not adequate enough to render the urine acid. At no time did he show constipation or complain of abdominal pain. A radiograph of the skull and the long bones revealed no appreciable deviation from normal. The analysis of an extracted tooth yielded eighty-eight parts per million of lead, which, according to available statistics, is within the normal range (Roche Lynch *et al.*, 1934). It is fair to add, however, that the number of teeth so examined is very small.

The patient stayed in hospital for six weeks and made good progress. Towards the end of this time his visual acuity improved so much that he could read small print, and his behaviour, though still somewhat facile, became otherwise quite reasonable. The blurring of the disks had largely subsided, and the other neurological signs disappeared, but the blue line on the gums was still well marked. The C.S.F. pressure returned to normal, and on November 15 the fluid showed 85 mg. of protein per 100 c.cm., with a trace of globulin. The blood urea dropped to 33 mg. per 100 c.cm., and the urea clearance was 74% of normal. We saw him two months after his discharge and found the optic disks and general condition normal.

### Discussion

It seemed quite clear that the case was one of lead encephalopathy, but owing to the presence of left-sided weakness and ocular changes, and marked increase in C.S.F. pressure, a space-occupying lesion in the cranium had to be considered. The history and chemical findings here led us to adopt an expectant policy, and the subsequent progress of the patient justified this fully. There are records of similar cases, especially in children, in which cerebral decompression and exploration for tumour have been carried out. Thus Bucy and Buchanan (1935) report three cases of encephalopathy in children in which similarity to cerebral tumour was so great that two of them were submitted to suboccipital decompression before the correct diagnosis was reached. Both of these, as well as a third case which was treated medically, ended in recovery. Machle (1935) described the occurrence in tetra-ethyl lead workers of delirious mania and confusion which resembled schizophrenia. Similarity of encephalopathy to cerebral tumour was observed by Eden (1935), whilst McKhann and Vogt (1933) noted that in children lead poisoning may resemble acute encephalitis. They mention as symptoms projectile vomiting, visual disturbance, stupor, coma, convulsions, elevation of blood pressure, choked disks, and, in extreme cases, separation of cranial suture. They believe that all this can be attributed to increased intracranial tension due to intense cerebral oedema, which if prolonged leads to degenerative processes owing to impairment of circulation.

We have not been able to discover records of lead content in cerebrospinal fluid in cases of lead encephalopathy, and although only a trace of it was found in the fluid of our patient, it is difficult to assess the exact significance of it because Rabinowitch and his co-workers (1933) reported the presence of lead in the cerebrospinal fluid of every individual in a small series of cases of lead poisoning. On the other hand, we recently had a patient suffering from severe lead colic whose blood lead was 0.335 mg. per 100 c.cm. (normal is *nil* to 0.1 mg.), whose twenty-four-hour excretion of lead in the urine was 0.89 mg. per 100 c.cm. (normal, *nil* to 0.11 mg.), and whose cerebrospinal fluid contained no lead.

It is interesting to note also that no gross abnormality was found in the urine of our patient, although renal function appeared impaired, and his urea clearance was still at the lowest limit of normal even after he had improved.

Considering the possible changes in the brain, which include liquefaction of the nerve cells (Lehmann *et al.*, 1926), extensive chromatolysis, and some glial proliferation (Cadwalader, 1912), our patient appears to have escaped lightly, from the point of view both of mental and of eye changes.

### Summary

The findings of a patient with lead encephalopathy are described.

Superficial similarity to cerebral tumour is pointed out.

Full recovery on expectant treatment is outlined.

We should like to record our gratitude to Mr. F. Morton, the hospital biochemist, for carrying out the analyses and for his helpful criticism.

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## SULPHANILAMIDE AS A PRESERVATIVE IN STORED BLOOD

BY

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Milan Novak (1939) describes experiments which indicate that the addition of small amounts of sulphanilamide to stored blood may be expected to prevent the development of contaminating saprophytes at low temperatures. These contaminants are often present in blood that has been stored for transfusion purposes, and they develop at refrigerator temperature, making the blood unfit for use for transfusions. The same phenomenon has been observed at times in this laboratory with horse blood for culture media: blood which is apparently sterile immediately after withdrawal from the horse begins to show the development of organisms after storage for a certain period in the refrigerator, with resultant wastage. The possibility of adding a harmless substance which will prevent the development of organisms during storage is of some importance. The following experiments are confirmatory of Novak's conclusions.

### Experiment 1

A rabbit was bled from the ear into citrate solution. To the blood a mixture of organisms isolated from contaminated human blood was added so as to give approximately 100 per c.cm. These organisms were mostly staphylococci and streptococci, with a few common sporing bacilli of the *subtilis–mycoides* type. To one portion of blood sulphanilamide 1:5,000 was added. The other portion was a control without any addition. Both samples were stored in the refrigerator at 2° C. and plated at intervals, the plates being incubated for three days at 37° C. The results are shown in Table I.

TABLE I

| | Initial | 3 Days | 7 Days | 14 Days | 20 Days |
|---|---|---|---|---|---|
| + Sulph. 1 : 5,000.. | 150 | 200 | 400 | 22 | 26 |
| Control .. .. | 100 | 2,000 | Uncountable | Uncountable | Uncountable |

### Experiment 2

240 c.cm. of oxalated rabbits' blood freshly drawn was divided into twelve equal portions. Sulphanilamide was added to give three portions containing 1:1,250, three with 1:2,500, and three with 1:5,000. The remaining three portions had none. To each dilution and each control a suspension of (*a*) *B. subtilis*, (*b*) *B. pyocyaneus*, (*c*) staphylococcus was added to give 10 to 100 organisms per c.cm. The samples were kept in the refrigerator and plated at intervals. The temperatures of refrigeration and incubation of the plates were the same as in Experiment 1. The results are shown in Table II.

TABLE II

| | Initial | 3 Days | 6 Days | 14 Days | 22 Days | 29 Days |
|---|---|---|---|---|---|---|
| *B. subtilis* : | | | | | | |
| 1 : 1,250 .. .. | 28 | 17 | 7 | 11 | 8 | 11 |
| 1 : 2,500 .. .. | 29 | 33 | 34 | 7 | 14 | 4 |
| 1 : 5,000 .. .. | 24 | 28 | 13 | 6 | 22 | 42 |
| Control .. .. | 56 | 19 | 48 | 14 | 800 | 1,000 |
| *B. pyocyaneus* : | | | | | | |
| 1 : 1,250 .. .. | 35 | 20 | 7 | 13 | 0 | 7 |
| 1 : 2,500 .. .. | 26 | 33 | 22 | 16 | 2 | 0 |
| 1 : 5,000 .. .. | 21 | 22 | 38 | 42 | 2 | 0 |
| Control .. .. | 99 | 26 | 60 | 40 | 29 | 2,000 |
| Staphylococcus : | | | | | | |
| 1 : 1,250 .. .. | 22 | 21 | 24 | 7 | 10 | 10 |
| 1 : 2,500 .. .. | 16 | 34 | 20 | 12 | 21 | 16 |
| 1 : 5,000 .. .. | 39 | 31 | 26 | 27 | 13 | 2 |
| Control .. .. | 48 | 37 | 49 | 49 | 20 | 13 |

It will be seen that the staphylococcus failed to develop in the control sample. It is also of interest to notice that the sulphanilamide was relatively effective against *B. subtilis*, presumably preventing the development of spores as well as inhibiting the multiplication of vegetative forms.

### Experiment 3

To three bottles of oxalated horse blood collected without any aseptic precautions was added sulphanilamide to give concentrations of 1:1,250, 1:2,500, 1:5,000. A fourth contained no sulphanilamide. The bottles were plated immediately after the addition of the sulphanilamide, were stored in the refrigerator, and plated at intervals. The results are given in Table III.

TABLE III

| | Initial | 8 Days | 15 Days | 21 Days | 29 Days | 35 Days | 42 Days | 49 Days |
|---|---|---|---|---|---|---|---|---|
| 1:1,250... | 10 | 72 | 300 | 250 | 12 | 26 | 20 | 45 |
| 1:2,500... | 18 | 500 | 80 | 480 | 17 | 17 | 23 | 12 |
| 1:5,000... | 19 | 124 | 500 | 368 | 95 | 480 | 1,600 | Uncountable |
| Control.... | 120 | 800 | 1,150 | Uncountable | | | | |

The contaminants were a mixture of various cocci and sporing bacilli as in Experiment 1. This experiment is perhaps the most informative of the series, since it approximates most closely to natural conditions. There are some anomalous counts in this table, but in general it will be seen that the two higher concentrations of sulphanilamide have, after some initial increase, prevented the development of the contaminants. A true condition of bacteriostasis has been achieved.

### Discussion

The observation that sulphanilamide in comparatively low concentrations exerts a preservative effect in blood stored at refrigerator temperatures is confirmed. Novak recommends the addition of 20 mg. of sulphanilamide to 100 c.cm. of blood. This may be expressed as 1:5,000, a concentration which in one of the experiments reported here did not prove adequate. The use of higher concentrations, up to, say, 1:1,000, would seem to offer a solution of the problem of storing blood in the refrigerator, provided the initial contamination is very small, as it should be if adequate precautions are taken in drawing blood. Where complete sterility is achieved there is obviously no need for any addition to the blood, but examinations of many specimens of stored transfusion blood and experiences with horse blood have shown that this is a rare condition; there are usually a very few organisms present which do not reveal themselves until the blood has been in the refrigerator for some days or weeks. Then they begin to multiply, and the blood is lost. It is to guard against this wastage and possible danger that the addition of sulphanilamide is suggested.

Novak, referring to his recommended concentration of 1:5,000 for storing transfusion blood, estimates that on transfusion of 500 c.cm. of blood the amount of sulphanilamide introduced would be 0.1 gramme, which he considers an extremely small dose. He adds: "Since the drug is readily absorbed from the blood by the tissues and since it is likewise rapidly excreted it is doubtful that any detectable elevation of blood sulphanilamide level will result even when multiple transfusions are administered." Colebrook and Purdie (1937) have shown that a 0.8% solution can be administered by intravenous drip without any ill effects. The only question, therefore, would seem to be whether there is any objection to giving small doses of sulphanilamide to patients who need blood only.

The sulphanilamide must be added to the blood in concentrated sterile solution. The powder is not readily soluble in water, and the most convenient method is to dissolve the requisite weight with heat in fifty times its weight of water and boil in a beaker for twenty minutes. The volume will then be reduced to about one-half the original quantity. This solution must be added to the blood while still warm, before the sulphanilamide begins to crystallize out. Sulphanilamide is stable to heat, and solutions may be autoclaved for five minutes. The simple method of boiling in a beaker as described is, however, quite adequate.

### Summary

Sulphanilamide in concentrations of 1:1,000 to 1:5,000 is effective as a preservative in blood stored in the refrigerator at 2° C.

The possibility of using the method to assist in the preservation of stored blood for transfusion purposes is discussed.

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## THE WAR AS AN AETIOLOGICAL FACTOR IN PSYCHIATRIC CONDITIONS

BY

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AND

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Among many other changes which the war will bring to the medical profession will be an increase of bureaucratic work: war injuries require not only treatment but also administrative measures, and the allotment of the expenses incurred will be based in many instances on the "attributability" to war injury. Many practitioners will be called on to express their expert opinion and to answer questionaries which will influence decisions regarding this thorny problem. The first condition necessary for the answering of such questions is obviously knowledge of the regulations on which decisions are based. Knowing, for instance, that "war injury" in respect of civilians means physical injury, the practitioner who is asked for advice or a certificate need not waste much time in discussing the prospect of a claim based on damage by fear, anxiety, or mental shock. When official certificates are required the forms to be filled in will usually quote the regulations concerned or will contain them implicitly in the questions.

The main difficulties encountered by medical experts are the incomplete aeticlogical knowledge in many conditions and the frequent incompatibility of medical and administrative (legal) conceptions. In no other branch of medicine are these difficulties so apparent as they are in psychiatry, where classification of illness is still so ill defined, where hardly any condition is regarded as due to one simple cause, and where prognosis and influence on earning capacity are so uncertain.

As it is to be expected that a great many cases to be judged will have a psychiatric aspect, it seems worth while to review the more common psychiatric conditions from this medico-administrative angle, not presuming to judge the final attributability, which depends on many factors and will ultimately be the province of experts, but to help doctors to answer questions in as useful a way as possible. This survey will mainly be an application of the aetiology as outlined for the various conditions in the chapter on medical psychology by D. Curran and one of us (E. G.) in Conybeare's *Textbook of Medicine*.

The questions put to the practitioner vary in their formulation, but they are bound to contain the following points: (1) What is the cause of the disability? (2) If it originated during service, was the origin determined by the conditions of the service? (3) Was the progress of the disability hastened by service conditions though not determined by them? (4) Has the effect of service conditions passed away, and, if not, when can such effect be expected to have disappeared?

An attempt will be made to answer these questions in reference to various mental illnesses.

### Schizophrenia

1. Schizophrenia is a hereditary illness. The way in which it is transmitted is not exactly known; at any rate, one recessive gene—possibly several—takes part in the transmission. For that reason it is often difficult, sometimes impossible, to trace the ancestors in question. This, however, is no argument against the hereditary basis of the individual case.

2. We know, however, that the "penetrative power" of the gene or genes under consideration is not 100%. In other words, additional causative factors take part in the manifestations of the illness. Thus in an outbreak of schizophrenia during the war the question of specific service conditions determining the origin will have to be carefully considered. Severe injury to the head, particularly to the brain, is acceptable as a precipitating factor if the psychosis starts immediately after the injury or if there is a continuity of the symptoms from the injury to the outbreak. Typical, though rare, is the sequence: injury—unconsciousness—delirious state—schizophrenic symptoms in a delirious setting—pure schizophrenia (that is, without clouding of consciousness). In case of doubt whether the delirious features have disappeared, one will obviously regard the case as an organic psychosis solely caused by the injury. Severe bodily illness starting off the same sequence of events will equally be regarded as the determining factor.

The psychological conditions of service in the forces in general can hardly be regarded as determining the origin of a schizophrenic illness. In the extremely rare instances, however, in which an acute psychological shock produces shock psychosis and this merges into a schizophrenic illness the same rules will apply as to physiogenic psychosis followed by schizophrenic pictures.

3. Under-nourishment, exhaustion, general infections—in short, all conditions which lower the bodily resistance—tend to hasten the progress of a schizophrenic illness. Psychological strain may act in the same way.

4. The more acute the schizophrenic illness and the greater the extent to which exogenic factors are operative in the origin, the better its prognosis. There is therefore a fair chance of cases precipitated by service conditions improving or recovering. Any relapse, unless specific precipitating factors can be found, is due to the nature of the disease. If judged in retrospect the end of the effect of service conditions can be assumed at the time of the optimum improvement; in prospect all factors have to be taken into account to determine the progress of a schizophrenic illness—heredity, pre-psychotic personality, type of illness, and weight of exogenous factors. Considering that only cases to which exogenous factors are largely contributory come under this heading, the duration of an acute attack may be estimated as between six and eighteen months.

### Manic-depressive States

1. Depressions are generally caused by the co-operation of constitutional (endogenous) and environmental (exogenous) factors. The weight of either causative component varies from case to case. For the purpose of discussing question No. 2 endogenous depression (melancholia) and reactive (exogenous) depression may be distinguished. It should, however, be borne in mind that both aspects, and their relative importance, must be considered in each individual case. The discussion of endogenous depressions (melancholia) applies, *mutatis mutandis*, to manic states as well.

2. Melancholia immediately following serious concussion or brain injury can be regarded as determined in its origin by the injury, in spite of evidence of heredity, previous manic-depressive phases, and the typical clinical picture of the "endogenous" type (retardation, self-reproach). The spontaneous recurrence of phases is quite unpredictable; on the other hand, precipitation of manic-depressive phases by apoplectic strokes is so typical and common that statistics used as argument against this assumption do not carry much weight. Some infectious illnesses, particularly epidemic influenza, are apt to precipitate depressive attacks of the endogenous kind: given the temporal connexion, such attacks will be considered as determined by service conditions if and when the infectious illness is so regarded. Psychological causes may precipitate the outbreak of a melancholic state. In such cases the psychological cause is not reflected in the clinical picture. Only experiences of considerable acuity and severity are capable of such precipitating effect, and, assuming they are due to service conditions or circumstances, they will have to be assessed in the light of the patient's personality and background before they can be said to determine the origin of the condition.

3. In cases in which the weight of circumstances seems less one may still consider that they hasten the progress of the disability. Reactive depressions, in contrast to the precipitated melancholic states, are in their symptomatology focused round the causative event. This, however, can be regarded as "determining the origin" only, as constitutional factors are always operative as well. Furthermore, the alleged service conditions or circumstances have to be compared with non-service ones in their significance in determining the origin of the state in question. Wartime conditions do not necessarily affect the soldier in their military aspect: previous and present difficulties in home and business, wrong decisions owing to the man's personal judgment of the war situation, may be conspicuous in determining his mental condition. There is also the paramount diagnostic decision whether and how far the present state is depressive (that is, determined by past or present psychological experiences), and how far it is hysteric (that is, caused and kept up by the subconscious tendency to use neurotic symptoms for individual purposes).

4. In endogenous depression the effect of specific conditions, if any, will have passed away by the end of the attack; in other words, any recurrences cannot be related to the factors operative in a previous attack, but have to be judged on their own merits. The more the precipitating factors are operative the better usually is the prognosis; six months is the normal rough estimate for the duration of a depressive attack. In reactive depressions the same considerations are valid, bearing in mind that on the average the duration is shorter. Reactive depressions lasting longer than a few months should be re-examined with the differential diagnosis from hysteria in mind.

### Neuroses

1. The diagnosis "neurosis" involves grave responsibility, as it is of course difficult to exclude all organic conditions. Besides, the conception is badly defined; and many discrepancies of opinion about attributability may

be due to different definitions which different experts have in their minds. In this review functional disturbances—in other words, such as lack an anatomical substratum—are called neurosis only if there is positive evidence of their psychological causation. (Palpitations, breathlessness, diarrhoea, and similar "functional" disorder may be psychological symptoms, but they may also be due to post-infectious exhaustion, constitutional inferiority, or abnormal susceptibility). A neurosis is the expression or the result of a person's incapacity to adjust himself to or overcome a particular situation in life, very often with much mental conflict. The individuality of the person concerned, his mental and physical endowment, his character, his upbringing, his social and moral standards, have to be taken into account if one tries to assess what amount of stress, what particular conflict, can be regarded as responsible for his breakdown; the military factors have to be sifted out from all the factors concerned, and their relative importance estimated, if the causation of the disability is to be judged. "Constitution" as such cannot be regarded satisfactorily as causing a particular reaction, but it will often be possible, and necessary, to demonstrate the patient's predisposition in his previous reactions and to point it out as one causative factor.

2. Many neurotic reactions can be traced back in the man's pre-service life, and this means, *ipso facto*, that the answer to Question 2 is in the negative; particularly in the case of the obsessional, paranoid, and hypochondriacal reactions, a careful anamnesis will often lead to this decision. Anxiety and conversion neurosis will with more frequency actually begin during military service, and are more likely to be determined in their origin by service conditions in that case. It is necessary, however, to search for contributory non-service factors, especially if there is no evidence or not much evidence of the individual's exposure to a particular military stress.

3. To answer Question 3 it is of the utmost importance to make sure, by all available means of psychiatric examination, if and how far the origin is determined by the patient's more or less subconscious wishes, hopes, expectations, or intentions, not specific to the specific service conditions or circumstances, but rooted in his personality and his response to a general situation, such as war, interference with career, home life, etc.

4. It will have to be remembered that the continuation as well as the origin of a neurotic reaction may be due to subconscious tendencies, and also that reactions originally determined by other factors, psychological or physical, may be continued by such mechanisms. Recurrences are particularly suspect of being due to wishful tendencies, so are psychogenic disturbances which start after a considerable latent period.

### Organic Reactions Types

This clinical group contains those psychiatric conditions in which the aetiology is known, and these will give the least difficulty. Psychoses after brain injury, of the organic type, are obviously caused by the injury; schizophrenic and emotional pictures have been discussed before. Organic reactions—that is, confusional states, delirium, etc.—with bodily illness, are caused by the latter; all further questions have therefore to be answered as in regard to the physical condition.

General paralysis raises some problems. It is known to be caused by syphilis, but practically nothing is known about factors determining the potential paralytic among syphilitics and those determining the onset of the cerebral disturbances after so long a latent period. It may therefore be asked, when paralysis starts during military service, whether these two points were possibly brought about by service conditions. There is no ground for assuming this in general; in the individual case this may be reconsidered when the patient is unusually young (below 30) or the incubation period is unusually short (under six years). In such instances, given conditions which are liable to reduce physical resistance, the assumption of part-determination in origin by military circumstances seems justified.

When the symptoms of general paralysis immediately follow cerebral injury, or the post-traumatic symptoms gradually blend with those of G.P.I., it is likely that the trauma has determined the actual onset at this particular time; if, however, the history reveals that vague or mild symptoms of G.P.I. have previously existed one will assume that military conditions have hastened the progress only and will fix the date when the effects of service conditions have passed away at a time when ordinarily the symptoms of an injury such as the patient has suffered would have disappeared.

*Neuroses After Concussion.*—The usual complaints following a serious concussion, such as headache, giddiness, intolerance of heat and alcohol, are functional, but not necessarily neurotic in the sense previously defined. They demand careful diagnosis because neurotic reactions after head injury generally show the same symptomatology. If such a neurosis is due to subconscious wishes and expectations rather than to the situation created by the injury it cannot be regarded as caused or determined in its origin by specific service conditions. On the other hand, one may be reluctant to deny any influence of the injury on the patient's condition, particularly in a transitional period, when a conscientious examiner will never be free from doubt as to whether a particular symptom is still a direct sequel of the concussion or is neurotic as defined before. In such instances one may be justified in assuming that the specific military circumstances hastened the development of the neurotic reactions. It will have to be remembered, however, that peacetime experience has shown that, in the absence of subconscious wishes for some gain through the illness, the post-concussional syndrome disappears within six months even after a severe concussion. It need not be emphasized that complications such as laceration of the brain or cerebrovascular disease must be excluded if "concussion" is diagnosed.

Neuroses after structural injury to the brain, laceration, haemorrhage, etc., present mainly a diagnostic problem with regard to reactions that, while appearing to be neurotic, may be caused fundamentally by a brain injury which brings about a change of the personality, rendering the patient unfit to cope with his previous problems. In neurosis after physical injury, other than cerebral, it has to be diagnosed, first, whether the physical damage is transient or permanent. The difficulty, similar to that in cases of concussion, lies in determining the time of recovery from the organic damage if the same or similar symptoms are being kept up by habit or psychological mechanisms; in the case of permanent damage, the importance of the loss as a neurosis-causing factor must be taken into account when reactions due to subconscious wishes, etc., are absent or are not regarded as caused by or as the outcome of specific service conditions.

It is hoped that these notes will help medical men to answer the questions in a more useful and less haphazard manner than seemed at first inevitable when confronted with them.

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C. C. Ling, S. S. Taur, P. C. Heuer, and S. Y. Yang (*Chinese med. J.*, 1940, **57**, 11) performed 110 sternal punctures and an equal number of blood cultures on typhoid and paratyphoid patients. As compared with blood culture sternal puncture yields a distinctly higher percentage of positive results and, owing to the heavier infection in the bone marrow than in the blood culture, gives a more rapid and abundant growth.

# Clinical Memoranda

## Biliary Peritonitis

The interesting account by Mr. D. M. Douglas and Professor Grey Turner of rapid death from bile peritonitis prompts me to record a case of my own which recovered, and the patient left hospital only a few days ago.

### CASE HISTORY

A woman of 50 was admitted on July 17, 1940, with biliary colic. This subsided in a few hours, and the temperature only reached 99° F. for two evenings. She was not jaundiced.

On July 31, 1940, she was operated on. The gall-bladder was enlarged, somewhat injected, and not thickened, and contained a single barrel stone. The common bile duct looked and felt normal, and was not opened. The cystic duct and cystic artery were defined and tied with ease. The gall-bladder was dissected and the fossa sutured *pari passu*, obtaining moderately good sero-capsular margins to stitch together. The whole field appeared clean and dry, and the abdominal wall was closed with fine interrupted silk, without drainage. The operation was a particularly easy one, lasting a little over half an hour. She returned from the theatre at 5 p.m.; by 10 p.m. my house-surgeon had had to be called to her twice (and order morphine on each occasion) as she was very restless and complained of much pain in the upper abdomen and in the right shoulder. Her colour was poor and her pulse of small volume, although the rate had only risen to 104. The following morning at noon I saw her; she was an ashen-grey colour (normally rather florid), distressed and anxious, with rapid shallow breathing. Air entry was poor at the right base, but there was no mediastinal shift or rise of temperature.

We considered the remaining alternatives to be intraperitoneal haemorrhage and biliary leakage. A blood transfusion of one pint was given during the afternoon. She was no better; indeed, her pulse steadily rose to 120. She was still in pain, and was pale, anxious, and restless. I thought there was dullness in the right flank, and noticed that turning her over on her side made the pain almost unbearable. It was decided that if there was to be an exploration then this was the time, and her abdomen was reopened that afternoon, exactly twenty-four hours after her first operation. There was some bile below the liver, and a fair amount in the kidney pouch, but most of it had seeped around between the liver and diaphragm—certainly less than ten ounces in all. There was no sign of infection. An excellent view was got of the operative site—the cystic duct was still snugly ligated. The origin of the leak was found to be a raw area the size of a penny where the capsule had torn laterally and escaped suture at the level of the neck of the gall-bladder. No ruptured bile channel could be seen. The torn capsule was included in three sutures embracing the liver beneath and the fossa margin opposite, and the bile mopped out. A corrugated drain was brought out in the flank through a stab wound and the median incision closed again. After this the patient never looked back. Her rapid improvement after the second operation was almost as striking as the rapid deterioration after the first. That night she was pink and warm, with a full pulse. The wound healed by first intention. The drain was removed on the fifth day, very little bile and no pus having drained. She was discharged well on the eighteenth day.

### COMMENT

For over ten years I have not drained a clean dry cholecystectomy, holding that, just as in a thyroidectomy, meticulous treatment to raw surfaces and bleeding points should leave nothing to be drained. Both their immediate and eventual post-operative course is so much smoother without a drainage tube. I was rather shaken, therefore, after scores of cases without incident, to come across this. Possibly the patient would have recovered without the second operation, as the amount of bile was small. I think, however, the real lessons here are: (1) more care should be taken over raw areas; and (2) one should not hesitate to reopen the belly in good time wherever there is such definite evidence of something having gone wrong. In the meantime I propose to continue the practice of draining only when there is something to be drained, and if I go another ten years without such a case as this I shall be happy.

Clinically there was no evidence of infection of the bile in this case, although it was not cultured. It seems likely that the bile acts purely as a chemical irritant, and that any bacterial invasion is terminal and adventitious. After all, a fatal pericarditis may be induced by chemical agents. The clinical picture was that of steadily progressive shock, pain, and interference with diaphragmatic action. The relief of all those features on removal of the cause was instant and dramatic: it seems that the inflammatory process was at once arrested; this is not what would be expected if the essential cause were bacterial.

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## Precipitation of Tetany by Calcium

The following case possesses some unusual features that may prove of interest.

### CASE REPORT

The patient, an unmarried woman teacher aged 42, was asthenic in type, and although of average height weighed only 5½ st. She had suffered for some years from attacks of vomiting, sudden in onset and usually lasting two or three days. A radiograph revealed a gastroptosis, with acute kinking of the second part of the duodenum, and a megacolon. The stomach failed to empty until nine hours after the barium meal. Treatment had included atropine by mouth and subcutaneous injections of prostigmin bi-weekly, with a saline enema at the same intervals, and she seemed to improve somewhat with this regime.

I first saw her on June 15, 1940, at the beginning of an attack of vomiting. The temperature was 97.2° F. and the pulse 100. She had a malar flush and a dry white-coated tongue. The abdomen was distended, especially in its upper half, and gastric peristalsis was easily visible through the papery abdominal wall. She was kept in bed on a graduated fluid diet, lying prone after her small and frequent feeds, and by June 21 she had apparently recovered. Colonic wash-outs were ordered three times a week, as the colon was loaded with faeces. By June 25 she was out of bed for a few hours a day, her general condition had improved, and she appeared to have gained weight. On July 1 there was a sudden onset of acute tetany. Both hands were immovably fixed in the typical *main d'accoucheur* position and the wrists and elbows were in full flexion, though a certain amount of passive movement was still possible at the latter joint. Three hours after the onset 10 c.cm. of 5% calcium gluconate was given at blood heat intravenously, taking five minutes over the injection. The usual warm flush was experienced after the injection, but after a further five minutes the patient's expression became anxious and the spasm was much worse. The abdomen was board-like, and the respirations were rapid and shallow. Speech was impossible. The intensity of the muscular spasm gradually abated during the next four hours, leaving the hands and wrists still affected. Eighteen hours later her condition was again deteriorating, and a mixture containing 30 grains of pulv. calc. lact. was given by the mouth. Within half an hour the whole skeletal musculature was in spasm and the patient became unconscious. Expirations became rapidly less and less, and the patient died with the chest in full inspiration about ten minutes later. Artificial respiration was impossible. There was no opisthotonos or risus sardonicus, but the skin temperature rose rapidly at death.

In view of the generally accepted principle that calcium is the drug of election in tetany and that the gluconate is the form best administered, it is interesting to note that in this case the attacks were precipitated by its use: and, furthermore, that calcium lactate, which is regarded by some as being of doubtful efficacy when given by mouth, precipitated the fatal attack. It would be interesting also to know the mechanism whereby tetany was produced in a patient whose attack of vomiting had completely subsided, who was not dehydrated, and who had returned to a more or less normal diet.

Ilford. RONALD PETERS, M.R.C.S.

# Reviews

## MEDICAL GENETICS

*An Introduction to Medical Genetics.* By J. A. Fraser Roberts, M.A., M.B., D.Sc., F.R.S.Ed. (Pp. 266; 94 figures. 15s.) London: Oxford University Press. 1940.

Most medical men, except perhaps those who have qualified in recent years, know little or nothing about the Mendelian laws, according to which inherited characteristics are handed on from one generation to another. Few of those who inquire into the subject get very far, and many are apt to give it up with the impression that genetics is an almost unintelligible and amazing mixture of sweet peas, evening primroses, coin-tossing, and banana flies. It is surprising how many accounts state that Mendel's original experiments were made with sweet peas; actually edible peas were used. The work under review does not make this mistake.

Dr. Fraser Roberts, a medical man himself and a distinguished human geneticist, is aware of these difficulties, and knows well how little most textbooks of genetics appeal to members of his profession, and for them his book completely alters the approach to the study of heredity. To explain simply and clearly the underlying principles he uses as examples only human factors and pedigrees of human families. The mathematical side of genetics is, very wisely, not stressed, for no more than a very few medical men take easily to statistics, and indeed almost all who attain to any proficiency do so only when the nature of their own investigations makes it imperative. The book makes easy, interesting, and even entertaining reading, and will no doubt be enjoyed by many laymen. The average medical reader, whose views of hereditary processes and the part played by them are hazy, will find his understanding of and interest in the genetic aspects of his work greatly increased, and, as the author suggests in his preface, may even be led to undertake a genetic investigation.

Medical men and students wishing to learn something of genetics will turn first to this very excellent work.

## THE STUDY OF ZOOLOGY

*A General Zoology of the Invertebrates.* By G. S. Carter, Ph.D. Foreword by Julian S. Huxley, F.R.S. (Pp. 509. 25s.) London: Sidgwick and Jackson, Ltd. 1940.

Students of zoology are being well served just now. We recently noticed Professor Lancelot Hogben's second and revised edition of his *Principles of Animal Biology*, a textbook on admirable lines for students seriously beginning such study. There could scarcely be a better or more acceptable discipline than to follow a knowledge of that book with a study of *A General Zoology of the Invertebrates* by Dr. G. S. Carter, lecturer in zoology in the University of Cambridge. The word "acceptable" is appropriate because one of the features which these books share in common is that they are interesting. Dr. Carter's book is intensely so. Its general point of view and purpose can be best indicated by a sentence or two from the author's own preface and from the foreword by Dr. Julian Huxley, the editor of the series of volumes of which this forms one. It is, says Dr. Carter, in no sense a textbook of invertebrate zoology. It has been written chiefly to meet the needs of the student in his first or second year at a university. He will be taking a course of descriptive zoology. There are many textbooks available for use with such a course, but the student also needs a book in which more general zoological problems are discussed. Dr. Julian Huxley says: "Studied in this way, the facts of invertebrate zoology take on a new significance. Instead of a bewildering procession of groups, each with its own elaborate details of structure to be memorized, the invertebrates reveal themselves as a series of major patterns of organization, adapted in different ways to securing progressive advance. . . . Dr. Carter's is one of the few attempts that have yet been made to secure this mutual illumination of systematic zoology and general biological principles."

As Dr. Huxley says, the task is a difficult one, but here it has been brilliantly essayed and accomplished. With the student's previous knowledge of elementary general principles, and with his parallel study of morphological types, he will have mistaken his course if he fails to be fascinated by Dr. Carter's development and discussion of the various questions with which his book is concerned. The first part deals with "protoplasm and the free-living cell," and the life-histories of the Protista; the second with "the multicellular body," its form, size, organization, and growth; the third with "comparative physiology" in the several systems; and the fourth with some general problems relating to the life-histories, the habits, and the behaviour of the invertebrates, and then to their evolution. The evolutionary aspect of the subject is kept in prominence throughout. The book is admirably illustrated by numerous figures in the text, and in addition there are thirteen plates of a clear and informative character. We may hope with the editor of the series that, "keeping step with the rapid upward movement of zoology," it will run into many editions.

## INCIDENCE OF MENTAL DISORDER

*New Facts on Mental Disorders. Study of 89,190 Cases.* By Neil A. Dayton, M.D. (Pp. 486; profusely illustrated with graphs and tables. 25s.; $4.50 post paid.) Springfield and Baltimore: Charles C. Thomas; London: Baillière, Tindall and Cox.

This book gives an analysis of the statistics derived from the examination of 89,190 admissions to mental hospitals in Massachusetts in the course of seventeen years. It is only the first volume. We are promised another, bringing the grand total (the epithet is not often so aptly deserved) to 121,000 admissions. It is well said in the preface that "the volume of work completed staggers the imagination." The title suggests that the author has no doubt that he has established "facts." He may fairly claim that at any rate he is likely to have avoided fallacies due to sampling. The book is singularly free from mathematical expressions, or from any evidence of preoccupation with problems of statistical reliability, significance, and the like; the omission is an advantage to the ordinary reader, and the fact that a statistician participated in the enterprise must be taken as a guarantee that all these problems were considered.

One of the more striking statements is that mental disorder in Massachusetts rose during the first German war, after America's entry. This is in curious contrast to what happened in this country during the years 1914–18. Is it true of the entire population, as with fighting troops, that the nearer to the front line the less mental illness exists? There was a further increase after demobilization, but a remarkable fall during the prohibition years, which, however, coincided with a time of maximal employment. The decrease was most pronounced in the alcoholic group of psychoses, but there was also a distinct fall in involutional psychoses and in "dementia praecox." From 1923 to 1929 there was a rise in admissions remarkably congruent with an increase in unemployment. There is some evidence that unemployment relief also relieved the mental hospitals. Males were more affected than females

by the trade depression, judging by mental hospital admission rates. The psychopathic group was affected by economic stress to a greater degree than any other, and was little affected by the war or prohibition. The author takes care to keep his sense of proportion when he remarks how comparatively little after all the general population appears to have been affected, as regards mental disease, by any stress whatever. None of the fluctuations except those related to prohibition and those shown by the psychopathic group were large. The incidence of mental disease is found to increase constantly with increasing ages of the population. It is suggested that it would be more appropriate to classify mental disease according to age than by any other method. This proposal at least calls attention to the interdependence of body and mind, and to the conception of structural disease as the end and finally irreversible result of what would at an earlier age have been regarded as "functional."

An interesting side of the book describes the statistical results connecting marriage and mental disease. Widowers exceed married men in the rate of affliction with mental disease by 130 per cent.; single men exceed married men by 200 per cent.; while divorced men have 400 per cent. more mental disease than married men. As regards sex differences, single men exceed single women in mental disease by 60 per cent.: divorced and widowed males show more mental disease than females in a similar state. It is suggested that, contrary to a popular belief, marriage "protects" the male more than the female: he is more often mentally ill if he does not marry, and also if he is so rash as to abandon marriage. The author has forgivably succumbed a little to the paradoxes superficially suggested by his figures. Some of the possible fallacies are clear enough. For example, men may be more tolerant of unstable wives than women are of unstable husbands; although even this is the opposite of public belief. Let it, however, be written down to the credit side of the male account.

The fact that the incidence of mental disorder at older ages is increasing is correlated with the increase that is taking place in physical diseases in persons over 50, especially in cerebral arteriosclerosis. On the other hand, it is cheerful to find that mental illness at the younger ages has recently been decreasing. Moreover, readmissions have also been diminishing of recent years, which suggests to the author increasing efficiency of treatment in the earlier attacks. In contrast again to ordinary expectation, it is found that the divorce rate is high in the economically dependent group, and lower in those who are financially well provided for. The general conclusion is reached that there has been a slight rise in mental disorder as a whole; but a serious problem of accommodation is produced by the chronicity of so many mental illnesses, especially at later ages, so that the average duration of stay in hospital is lengthening.

It has been fashionable in some quarters to despise pedestrian work of this kind, but such an attitude is often little better than an excuse for doing nothing so thorough oneself. Such painstaking labour commands respect, and so also does the organization involved.

## ESSENTIALS IN DIAGNOSIS

*Essentials of the Diagnostic Examination.* By John B. Youmans, B.A., M.S., M.D. (Pp. 417; illustrated. $3.00, or 16s. 6d. net.) New York: The Commonwealth Fund; London: Oxford University Press. 1940.

Dr. Youmans rightly holds that most diagnostic errors are due to insufficient histories and inadequate examination. The way in which candidates for diplomas approach a case often reveals the fact that such deficiencies are chiefly due to lack of orderly thinking. Told to examine the heart, many candidates use the stethoscope first instead of last. Another serious fault is the demand for laboratory tests before carrying clinical methods as far as they will go. Confronted with a case of jaundice, and asked how he could determine whether it was obstructive or not, such a candidate requires a van den Bergh test but does not inquire as to the appearance of the faeces. He asks for an electrocardiogram and omits to feel the pulse. If directed to feel it he seems to gather but little information from it. Every teacher of medicine knows how prevalent and persistent such faults are. The purpose of this book is to provide in small compass a guide to the essentials in diagnosis and to impress upon the mind of the student the importance of system in the clinical examination of a patient. To emphasize this the book is divided into two parts, the first of which deals with history-taking and physical examination. Not until these have been systematically considered do we find reference to laboratory tests, which are described in the second part. A distinction is also drawn between those tests which the practitioner may reasonably be expected to carry out himself and those which call for more special technique and equipment. This is an excellent plan, and the whole book is designed as a useful corrective of loose thinking and careless examination. It is published under the auspices of the Commonwealth Fund, and although the price seems rather high for so small a work, this is presumably due to the excellent coloured plates illustrating the pathology of the blood.

## SURGICAL ANATOMY

*Surgical Anatomy.* By Grant Massie, M.B., M.S., F.R.C.S. Churchill's Empire Series. Fourth edition. (Pp. 472; 158 illustrations, many in colour. 21s.) London: J. and A. Churchill. 1940.

Mr. Grant Massie's *Surgical Anatomy* has reached a fourth edition. This continues on the same lines as the previous issues and well fulfils the original purpose of its author—namely, to provide the student with a not too bulky textbook which presents the essential facts of anatomy in combination with brief references to the bearing of these facts upon future clinical work. Revision of anatomy during the later stages of the medical curriculum is thus rendered more speedy and attractive than if an attempt were made to reread the more complete but strictly descriptive accounts of many of the standard works on human anatomy.

A considerable number of excellent new illustrations and reproductions of *x*-ray photographs, with certain additions to the text, appear in the new edition, and special mention may be made to the references to recent work on the surgical anatomy of the thorax and abdomen; but besides these allusions to new surgical procedures students of to-day would appreciate some mention of the work which has been accomplished lately in the domain of microscopical anatomy and experimental embryology. Notice of such work has hitherto been generally omitted from elementary textbooks on applied anatomy; we believe, however, that the time has come when the findings which are of definite surgical importance should be included: for instance, recent observations on the growth of bone; the vascular supply of the epiphyses of long bones; the growth of capillary blood and lymph vessels; together with some allusions to the work which has been carried out on the central and peripheral nervous systems. The introduction of short notes on such subjects, with references to original articles, would greatly enhance the practical value of books on applied anatomy and give some indication of advances now being made in the domain of microscopical and experimental anatomy.

## Notes on Books

A second edition of Professor J. E. FRAZER'S *Human Embryology* has been issued (Baillière, Tindall and Cox, 30s.). The general scheme remains unaltered, but certain changes have been introduced and new figures added; for instance, a point of general interest to which he has drawn attention with reference to the foetal circulation is that the older and hitherto generally accepted view of there being two separate currents of blood—one from the inferior vena cava, the other from the superior vena cava—passing unmixed through the cavity of the right auricle, must be replaced by the more recent conception, which is based upon the finding by direct experiment of Kellogg and others, that the two blood streams do mix on entering the heart, and consequently that the venous blood entering the heart from the lower part of the body and that from the upper part are of equal value. We are glad to note the more frequent use of explanatory legends for the figures in order to supplement the descriptions in the text; it would be better, however, if these legends were more complete and if very illustration had its caption. The book is in many respects unique, being a document which represents the life-work of a single individual, who has approached the subject of human organogeny with an unbiased mind, but has paid little attention to the problems of histiogenesis and experimental embryology which have engaged the attention of other workers. It is thus a work which, though incomplete in some respects, is an indispensable adjunct to research workers on human organogeny.

In the compilation of the *Brazilian Medical Index-Catalogue for 1937–8* Dr. Jorge De Andrade Maia, the librarian of the Medical Faculty of São Paulo University, has performed a valuable service to bibliography. The work, which is an indispensable guide to the literary activity of the medical world in Brazil, is modelled on the *Quarterly Cumulative Index* published by the American Medical Association.

A fifth edition of Prof. F. J. BROWNE'S booklet, *Advice to the Expectant Mother on the Care of her Health and that of her Child*, which first appeared in 1926, has been published by E. and S. Livingstone of Edinburgh. The price is 6d., plus 2d. for postage.

## Preparations and Appliances

### IMPROVISED APPARATUS FOR OXYGEN THERAPY

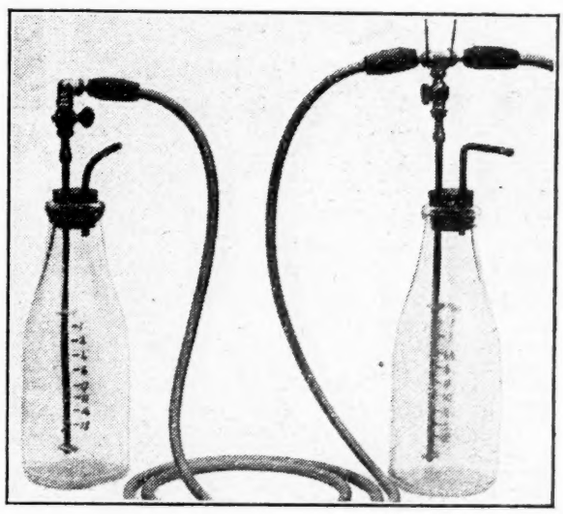
Dr. H. MARCUS BIRD, Honorary Anaesthetist, West Suffolk General Hospital, Bury St. Edmunds, writes: In view of the recent articles dealing with "blast-lung" an account of an improvised oxygen therapy equipment which has been in use at the West Suffolk General Hospital for several months may be of interest to medical officers in charge of resuscitation wards. The equipment consists of a combined flowmeter and humidifier, with a controlling tap for each bed, connected by flexible pipe-lines to a bank of oxygen cylinders fitted with reducing valves; and the whole, with the exception of the reducing valves, can be made by any ironmonger.

The flowmeter consists of a quart milk bottle with a rubber stopper bored with two holes to take copper tubing of 1/4-inch diameter. One piece of copper tubing is twelve inches long and has seven holes half an inch apart bored in its side at the lower end with a 1/16-inch drill. A washer is soldered to the tube just above and below these holes. The washers have slots cut in them to carry a strip of celluloid (old *x*-ray film) on which the rate of flow of oxygen in litres per minute is painted. The top hole passes 1 litre and subsequent holes 3, 4½, 6, 9, 12, and 18 litres approximately. The top end of the tube is tapped or soldered into the nipple of an ordinary household gas-tap fitted to a T-piece with side nipples to connect to the flexible pipe-line, which consists of ordinary armoured flexible gas-tubing with rubber connectors. The terminal flowmeter of each set of pipe-lines has an elbow-piece instead of a T-piece. A four-inch length of copper tubing bent to a right-angle is fitted into the second hole in the rubber stopper to connect to the inhaler.

The flowmeters are filled with distilled water to the level of the top washer and either tied to the head of the bed or fixed to the wall in metal baskets—a better arrangement than having them standing on the locker beside the bed, where they are liable to be pulled over.

A bank of two 100 cu.ft. oxygen cylinders each fitted with an "Endurance" reducing valve, which permits regulation of pressure, is enough for at least six beds, with a flow of nine litres a minute at each bed if required.

As inhalers for adults we employ spectacle-type nasal catheter carriers (Tudor Edwards) with three-inch lengths of cycle-valve tubing. These can be made locally from cheap metal spectacle frames and 1/8-inch copper or brass tubing bent upon a jig. For children we use a Burgess box, and this has



proved most efficient. Our B.L.B. inhaler is reserved for cases that have to be transported, and is used with a 30-gallon oxygen cylinder, which can be laid on the stretcher beside the patient, no flowmeter being required if all the ports are closed.

It is advisable to use distilled water in the flowmeters to prevent deposits on the glass, and a 1/16-inch twist drill should be included in the kit for cleaning out the holes in the flowmeters after prolonged use.

In addition to its use in resuscitation wards the whole equipment, with the exception of oxygen cylinders and milk bottles (which can be obtained locally), is readily transportable, and can be set up anywhere in a few minutes. The total cost was under £2 for eight beds.

### "ISOFLAV" TABLETS

"Isoflav" solution tablets (Boots Pure Drug Co., Ltd.) contain proflavine sulphate; one tablet in 4 fl. oz. of distilled water makes a 1:1,000 isotonic buffered solution at approximately *p*H 6.3.

The acridine disinfectants have a high reputation for producing a disinfectant action without tissue injury. Recent work has shown that proflavine in neutral solution is less harmful to delicate tissues, such as the brain, than is acriflavine. Isoflav therefore promises to be a valuable preparation for the control of wound infection.

### TWO DRUG PREPARATIONS

We have received from Messrs. Parke, Davis and Co. samples of two new additions to their list.

Sterilized solution of nikethamide contains 0.5 c.cm. of drug in 2 c.cm. of water. It is given by intramuscular or intravenous injection. The drug stimulates the respiratory centre and causes improvement in the circulation. It is used in a wide variety of conditions of depression of the respiratory and circulatory systems.

Sterilized solution of mersalyl contains mersalyl 3 grains and theophylline 1½ grains in 2 c.cm. of water. The preparation is suitable for intravenous or intramuscular administration and has a very powerful diuretic action.

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## CHRONIC BENZENE POISONING

The application of benzene in a variety of industries has rendered the study of the pathology of benzene poisoning a matter of great importance. The realization by the larger firms that benzene is a dangerous and insidious poison has led in some cases to measures of protection and medical control which keep the incidence of toxic episodes down. The sort of information which a plant manager seeks on a substance of this sort is, first, what the safe limits of concentration are; secondly, how the toxic material enters the system; and, lastly, how the evidences of poisoning are to be determined. The second point is answered with relative ease, for in industrial conditions the only ways in which benzene can enter the organism are by inhalation and through the skin; hence the principles of protection to be followed are easily determined. But it is not possible to lay down the safe limits of concentration in which man may work for years without developing signs or symptoms of poisoning. Although acute benzene poisoning in industry is rare, chronic poisoning may arise from concentrations of vapour which seem to be innocuous to most workers and may become manifest even after the worker has been removed from exposure altogether and has become employed in a totally different sort of work. Thus, one of the conclusions reached by Hunter[1] is that it is doubtful whether any concentration of benzene greater than zero is safe over a long period of time. No doubt many businesses using large quantities of benzene would counter this statement by showing that their records do not disclose significant numbers of cases of poisoning, but those experienced in industrial medicine know or suspect that many men and women in industry disappear into the limbo of the improperly diagnosed, and that only by the most scrupulous (and, unfortunately, often impracticable) investigations can the signs of chronic poisoning be elicited. Only by routine and extensive clinical and haematological examinations of all workers exposed to benzene can it be decided whether chronic poisoning is present. This applies not only to the big users of the material, who may be presumed to be well informed and alive to the hazard, but also and much more so to the smaller firms, who may not be in a position to apply the proper methods of medical control. It is not to be supposed that the frequently superficial examination to which workers are subjected in conformity with the Chemical Works Regulations would suffice for the detection of chronic benzene poisoning. Wherever there is a hazard of benzene poisoning it is essential to establish facilities for the routine examination of the workers by both the usual clinical and the more complex haematological and biochemical methods.

[1] *J. industr. Hyg.*, 1939, **21**, 331.

The criteria by which chronic poisoning can be recognized are not easy to state. Until very recent years the pathology of benzene poisoning had been studied in animals more extensively than in human beings. The classical features of the disease had been laid down as anaemia, leucopenia, thrombocytopenia, and evidences of purpuric tendencies, with a pathological background of aplasia of the haematopoietic tissues. There is no doubt that a history of exposure to benzene with a blood picture of this sort would provide almost certain evidence of benzene poisoning, but the literature now contains a very significant number of reports of cases in which the blood picture was entirely different and chronic exposure to benzene was unequivocally demonstrated. The journal in which Hunter's article[1] appeared is entirely devoted to papers on chronic benzene poisoning based on observations by recognized authorities. It is not possible here to do more than refer briefly to some of the more striking observations recorded. Hunter records the result of investigation of eighty-nine persons who had been exposed to benzene for periods varying from a few months to over twenty years. Of these eighty-nine cases ten had been fatal and histological material had been obtained in eight of them. Hunter points out that the severity of the action on the marrow depends upon how effectively the benzene is detoxicated by the liver and thus prevented from reaching the marrow. But in chronic poisoning it is inhaled benzene which is the main source of the injury, because inhalation allows the toxic agent to reach the marrow before being detoxicated in the liver. In such cases the blood picture is by no means as simple as might be expected from the textbook description of benzene poisoning—namely, aplastic anaemia. Analysis of the blood findings in these eighty-nine cases showed that benzene poisoning may cause polycythaemia or anaemia; leucocytosis or leucopenia; leukaemia or leukaemoid blood pictures (lymphatic or myeloid); eosinophilia; megalocytosis or microcytosis; as well as the presence of immature marrow elements in an otherwise normal blood. The usual practice of accepting leucopenia as confirmatory of benzene poisoning suspected on other grounds is condemned, and it is concluded that early diagnosis should be based on the whole blood picture. As an early sign of marrow injury some emphasis is laid upon eosinophilia, even when the erythrocyte count is normal or even raised. A point of some interest was elicited in the fact that in two cases splenomegaly was observed—a feature usually absent in chronic benzene poisoning.

The demonstration in some cases of a severe leukaemia is to be considered in relation to the findings of Mallory, Gall, and Brickley in the same journal on the pathological data obtained from nineteen patients with a history of chronic exposure to benzene. These authors showed that the entire haematopoietic system was affected, but no such uniform picture as might be expected from the usually accepted "aplastic anaemia" view was found. The bone marrow presented features varying from severe hypoplasia to the most extreme hyperplasia and extramedullary haematopoiesis. So far from hypoplasia or aplasia being the usual picture, the more common reaction of the marrow was hyperplasia. Hyperplasia was found only

in patients with prolonged exposure, and hypoplasia was present in cases of either short or long exposure. The commonly held opinion that women are more susceptible to benzene than are men is not supported by Hunter's studies, but Mallory and his co-workers found that hyperplastic reactions are more common in men and hypoplastic in women. Two cases of undoubted leukaemia, one fatal, were present in this series, and it is pointed out that the evidence, rapidly accumulating, that chronic exposure to benzene produces leukaemia commands serious consideration. An extensive examination of the blood of 332 workers in rotogravure printing works, in which large amounts of benzene are used, is reported upon by Greenburg, Mayers, Goldwater, and Smith in the same journal. Among many points of great significance elicited in this work is the practical one of determining what combination of blood tests would be most likely to assure an almost certain diagnosis of chronic benzene poisoning. A combination of a leucocyte count, a red cell count, and determination of mean corpuscular volume would, according to these workers, have detected 93% of the affected persons; whereas a leucocyte count alone would have revealed only some 40% of the positive cases. If to these tests were added the platelet count (thrombocytopenia) the percentage of detected cases would have risen to over 97%. Greenburg and his co-workers believe further that a macrocytosis in a benzene worker is suspicious of poisoning even in the absence of all other abnormalities. The suggestion that the determination of the ratio of inorganic to total urinary sulphate is a good index of benzene absorption was not entirely borne out in Greenburg's cases, in which of eighteen severely exposed men five showed normal sulphate ratios, but it would appear that this matter was not pursued very fully.

## CREATINE IN THE ANIMAL ECONOMY

Creatine, which was first isolated by Chevreul from extracts of meat, and the allied creatinine, the form in which it appears in the urine, belong to the guanidine group. They give various colour reactions which have been developed into means of detecting and estimating them. Recently they have taken on great importance, especially in relation to muscle contraction, in both physiological and pathological states. Indeed, 95% of creatinine is in the muscle tissue, which contains 300 to 600 mg. per 100 grammes; there is much less in the viscera. A recent monograph by two French authors,[1] one a physician, the other a biochemist, which collates the knowledge obtained by recent advances, will be welcome. (It was published shortly before the German occupation of Paris.) The authors rightly state that there are many gaps in our knowledge, but their book will help to define the present position and suggest where further research is to be made. The precursors of creatine are not certain. Two groups of substances may give rise to its formation: those which contain the urea or guanidine group already (guanidines, imidazols), or substances capable of combining together in the necessary synthesis (amino-acids and urea). The purines appear more likely than the guanidines. The function of creatine in neuromuscular phenomena is complex. The hydrolysis of phosphocreatine as a source of energy in muscle is becoming clearer. For muscular contraction there must be an equilibrium between its different phosphorilized components and the successive agents of their hydrolysis and their rephosphorilation: a balance of glycogen, creatine, adenylic acid, and oxygen in a perfect acid-base equilibrium. The further questions of muscle toxicity and fatigue remain for elucidation.

The liver appears to be the main site of creatine formation, though other organs may take part. After absorption from food—or synthesis in the liver, muscles, or other tissues—creatine becomes fixed to the muscle tissue to combine finally with phosphoric acid and become phosphogene, an important source of energy in muscle contraction by promoting the oxidation of sugars. Thus the complex metabolism of creatine may be upset at many of its stages; the unused creatine may escape in the urine, and creatinuria indicates an imperfection in metabolism. Excretion normally takes place as creatinine, a dehydrated form. Elimination is deficient in nephritis and some affections of the liver. The rise of creatinine in the blood is usually parallel to that of urea, but the former appears to be of greater prognostic value. From the clinical point of view the demonstration of creatine in the urine, its measurement in the blood, and the determination of the amounts of creatinine in the urine and blood, will give an idea of the creatine balance. Various combinations of these factors may be discovered. Creatinuria without much accumulation of creatine in the blood occurs in wasting and other forms of histolysis, anoxaemia through respiratory or circulatory disease, hepatitis, and some muscle diseases. Following extensive burns, in diabetes, heart failure, and myasthenia, creatinuria is found with low values of creatine in the blood. A further possibility is that lowering of the katabolism of creatine may allow of creatinuria without accumulation in the blood and of hypocreatininuria too. Important modifications are met with in renal affections, and are used as means of determining renal inefficiency.

Much remains to be found out, but at least the clinician, like the biochemist, is becoming aware of the cycle and functions of creatine. The book contains a full bibliography of papers on the subject published since Kayser's monograph appeared in 1934.

[1] *La Créatine: Etude Physio-pathologique.* By Jean Vague and Jean Dunan. Preface by Professor J. Roche. Paris: Masson et Cie. $1.40.

## TUBERCULOSIS CASE-FINDINGS BY MASS SURVEYS

The Bureau of Tuberculosis of the Department of Health in New York City first began mass surveys in 1933, and since that date over 225,000 persons have been investigated. Dr. H. R. Edwards, Director of the Bureau, in some studies of the results of these surveys,[1] including radiographs of over 162,000 adolescent and adult persons, representing fifteen population groups, states that the tuberculin test was used in the first place to detect the incidence of tuberculous infection in a given area or section of the population; and, secondly, in order to reduce *x*-ray costs by eliminating persons not infected.

[1] *Amer. Rev. Tuberc.*, 1940, **41**, Supplement.

It was thus of value in high-school populations where the incidence of infection is low; it was useless when the rate of infection was over 50%. The studies have confirmed the greater sensitivity of the intracutaneous test as compared with the patch test, provided, of course, the full test dose was used. Diagnosis by *x*-ray film was the radiological method of choice, and the Powers Rapid Paper process (in roll form) was found to offer "speed, accuracy, and facilities in handling" that were superior to and less costly than those afforded by any other method available. The amount of tuberculosis detected in these surveys varied widely according to age, sex, race, and economic factors in a given population. Chronic pulmonary tuberculosis was diagnosed on an average in 4%; this included all lesions characteristic of the reinfection form of the disease. "Clinically significant" lesions were diagnosed "in all cases in which the radiographic shadow indicated a lesion typical of a reinfection form of the disease varying from those obviously active, with associated constitutional symptoms and physical findings, to those without associated findings, but in which the stability of the lesion cannot be determined without periodic supervision." Such lesions were seen in 2.5% of those examined by *x* rays. The following percentages were obtained for chronic pulmonary tuberculosis and "clinically significant" lesions in various groups:

| Group | Number Examined | Average Age | Percentage of Chronic Pulmonary Tuberculosis | Percentage of "Clinically Significant" Lesions |
|---|---|---|---|---|
| High-school students .. | 15,795 | 16 | 0.4 (67 cases) | 0.4 (58 cases) |
| College students .. .. | 16,810 | 19 | 0.3 | 0.2 |
| National youth administration enrollees | 8,708 | 21 | 2.0 | 0.9 |
| Guides .. .. .. | 1,917 | 27 | 2.5 | 1.0 |
| Teacher applicants .. .. | 3,185 | 27 | 2.6 | 1.0 |
| Fire department applicants .. | 5,279 | 29 | 1.3 | 0.8 |
| Health department applicants | 1,306 | 30 | 4.7 | 1.1 |
| House of detention prisoners | 1,023 | 32 | 3.7 | 1.0 |
| Lower Harlem Home relief recipients | 65,459 | 36 | 4.1 | 2.9 |
| Riker's Island prisoners .. | 3,892 | 39 | 10.6 | 4.5 |
| Furriers Union members .. | 4,972 | 40 | 7.0 | 1.3 |
| Transient and homeless men | 4,716 | 51 | 16.0 | 5.3 |

Although tuberculosis mortality was much higher among negroes than among the white population, morbidity was found to be actually lower. This is probably due to the fact that the disease is more quickly fatal among negroes. The group presenting the greatest problem to the community would appear to be the "transient" and homeless men, who have ample opportunity of infecting others. Dr. Edwards's studies should convince the authorities in this country of the need for adopting a similar procedure if we are to control a disease which will undoubtedly spread as a result of war conditions.

## PULMONARY VENTILATION AND ANAESTHESIA IN CHEST SURGERY

Major operations on the chest in which a pneumothorax is produced are always associated with considerable respiratory embarrassment. One lung is unable to function, and the other is at a considerable disadvantage because of the paradoxical movement of the mediastinum and because rebreathing takes place into the lung on the open side at each respiration. Positive-pressure continuous-flow anaesthesia does not overcome these disadvantages completely, and, in addition, it increases the difficulty of expiration so that the carbon dioxide content of the arterial blood tends to rise during long operations. A machine has recently been designed[1] which, it is claimed, regardless of a unilateral or bilateral opening of the chest, will permit physiological quantities of gas to be given during the inspiratory phase, the lungs emptying themselves without any resistance during the expiratory phase. It consists of a circle filter anaesthetic machine of the closed circuit type, using carbon dioxide absorption, into which the basal oxygen or anaesthetic gas is introduced by an injector. The kinetic energy of the incoming gas is thus used to assist the patient's efforts in circulating the anaesthetic mixture. In addition, the reservoir bag is enclosed in a rigid chamber in which the pressure is rhythmically varied by means of a Frenckner spiropulsator, so that the bag is alternately compressed and released. In this way the patient's breathing can be helped, and if a sufficient degree of hyperventilation is produced at the beginning of the anaesthesia the respiration is soon taken over entirely by the machine. This is the normal practice, and the tidal volume is then maintained automatically at the high level of 500 to 600 c.cm. It is claimed that sufficiently deep anaesthesia can usually be produced with nitrous oxide and oxygen alone without allowing any suboxygenation. An analysis of ninety-four intrathoracic operations with automatic respiration bears out the author's claims that shock is lessened and the risk of cardiac failure diminished when this form of anaesthesia is employed.

[1] *J. thorac. Surg.*, 1940, **9**, 237.

## CONTROL OF TROPICAL DISEASES

The thirteenth meeting of the Industrial Advisory Committee of the Ross Institute was held last month. As a recent instance of the kind of help the Institute was affording in these times the chairman, Mr. G. H. Masefield, mentioned that large quantities of malariol were suddenly required to meet a war emergency in a country where climatic conditions were entirely different from those encountered in the countries in which malariol mixtures are generally employed. A mixture had to be made immediately and tested from stocks of oil available in this country which are quite different from those used for the manufacture of the mixtures over-seas, and the problem was further complicated by the fact that supplies of oil from the various companies are now controlled by the Petroleum Pool, with the consequence that oils from different companies are bulked together. Fortunately, owing to the close concern of the Ross Institute in research on this subject, a suitable mixture was worked out and tested in a very short time and proved to be a satisfactory solution of the problem. The main concern of the committee is at present to see that progress in health work on plantations and mines and elsewhere in the Tropics is maintained during the war. Sir Malcolm Watson, director of the Ross Institute, described the journey of 35,000 miles in Africa, India, and Ceylon which he recently undertook in order to investigate disease control measures in many industries and Government areas. He said that in Southern Rhodesia there was every reason to believe that in the course of the next few years successful results would be obtained in the control of malaria such as had been achieved in other countries where the methods recommended by the Ross Institute had been adopted. On visiting the tea estates in Southern India and Assam he discovered what he believed to be the greatest achievement in the prevention of malaria which had taken place during the last ten or twelve years. As a result of improved health and reduced sickness the employees, who number 18,000, received in 1938 over 100,000 days' pay more than they received ten years ago. In Hyderabad, following on the recommendations he made in 1929 on the invitation of the Nizam's Government, not only had the spleen rate of children been reduced practically to zero, but a suburb

of the city which was rapidly being abandoned had again become prosperous, and a new suburb was being built in an area previously regarded as too unhealthy for habitation. Plague, after killing some 16,000 people a year in Hyderabad, had become an almost negligible disease. He added that it would have been impossible to construct the Singapore base but for the control of malaria, and apart from such control there was every reason to believe that the population in the naval base would have suffered the appalling death rates which occurred on the rubber estates and elsewhere in Malaya in the early part of this century. Sir Wilson Jameson, dean of the London School of Hygiene and Tropical Medicine, spoke of the interruption in the routine of teaching which had taken place as a result of the war. Instead of courses of five or nine months' duration, the school had concentrated on short courses of from two to six weeks for persons about to undertake service in some part of the Tropics. In all this it had been working in close co-operation with the Colonial Office and with the Army Medical Department. It was hoped, however, to begin the standard five-months course in tropical medicine and hygiene at the end of September.

## INSECT BITES

Cherney, Wheeler, and Reed,[1] starting from the supposition that immunization against insect bites would materially decrease the chance of contracting diseases transmitted by the particular insect concerned, experimented by injecting a number of persons with extracts made from fleas. First they found that intradermal injections of these extracts gave greater reactions in persons who suffered irritation on being bitten by fleas than in those who were not so troubled; secondly, by a series of subcutaneous injections of the extracts they were able to reduce the sensitivity of the first group to the intradermal injections of the extracts; and, thirdly, the subjects so immunized found they were less annoyed by fleas than previously. So far the argument is not unreasonable, but it seems open to question whether such injections would necessarily influence the transmission of any disease carried by fleas. The annoyance of a flea-bite may be due not only to the mechanical trauma of the bite but also to some irritant property of the insect's saliva, and if the latter were the personal dominant factor it might well be possible by injections of flea proteins to produce freedom from the irritation of bites; but whether such injections would discourage the fleas from biting is another matter. Unfortunately the authors do not seem to have compared by direct observations the behaviour of fleas on sensitive and insensitive persons; but obviously such experiments would be of interest and value.

## TRYPANOCIDAL SUBSTANCES IN THE SERUM IN SCARLET FEVER

Since the work of Laveran and Mesnil[2] it has been known that human beings and anthropoids are resistant to a number of trypanosomes which infect animals and cause such diseases as nagana, dourine, and surra. This resistance is thought to be correlated with the presence of trypanocidal substances in the blood serum of man and anthropoids, though little is known of the character of these substances except that they are quite distinct from trypanocidal immune bodies. It has been suggested, however, that their presence in the blood serum is dependent on the normal functioning of the liver. According to Rosenthal and Krüger[3] they are almost entirely absent from the blood serum of newborn infants, and, it is claimed, in cases of dysfunction of the liver. In scarlet fever, according to Ströder,[4] there is a defective action of the liver, as shown by the presence of bilirubin in the blood and in the skin; if, therefore, the theory that these trypanocidal substances are formed in the liver is correct, they should be reduced in scarlet fever. In experiments with *Trypanosoma brucei*, however, he has found that the serum from a number of patients with scarlet fever was quite as active trypanocidally as that from normal controls. The site of formation of the trypanocidal bodies found in normal human serum thus still remains uncertain.

[1] *Amer. J. trop. Med.*, 1939, **19**, 327.
[2] *Ann. Inst. Pasteur*, 1902, **16**, 785.
[3] *Berl. klin. Wschr.*, 1921, **58**, 382.
[4] *Arch. Kinderheilk.*, 1939, **118**, 1.

## BENZEDRINE, EPHEDRINE, AND PAREDRINE

The pharmacological actions of the sympathomimetic amines have proved puzzling when studied in detail. Ephedrine, for example, has a curiously selective action on plain muscle and also has a stimulating effect on the central nervous system which cannot be related to any known action of adrenaline. This latter effect was shown still more intensely by benzedrine. Recent work by Mann and Quastel[5] suggests an explanation of some of these results. Most body tissues contain an enzyme, now called amine oxidase, which oxidizes most of the sympathomimetic amines. The oxidation products, probably aldehydes, have the power of inhibiting the oxidation of glucose; this can be demonstrated on brain slices particularly clearly. Benzedrine and ephedrine are not acted on by this oxidase but combine with it and thus inhibit its action on other amines. Hence benzedrine inhibits the oxidation of tyramine and prevents the depressant effect of its oxidation products on the oxidation of glucose. This suggests that the stimulation of the brain by benzedrine and ephedrine is due to an indirect action; they inhibit the amine oxidase and prevent the formation of depressor substances that presumably are present in the brain normally. There is evidence that in other tissues benzedrine and ephedrine inhibit the oxidation of adrenaline and potentiate sympathetic activity; thus they act in relation to the sympathetic system in the same manner as physostigmine acts in relation to acetylcholine and the parasympathetic system. The discovery of the properties of ephedrine and benzedrine has revived an interest in the action of the sympathetic amines. German workers have tried to find a drug having a prolonged pressor action but not causing cardiac acceleration, and a series of sympathetic sympathomimetic amines (such as veritol) have been produced and recommended for the treatment of shock. The therapeutic effect of one of these drugs, paredrine ($\beta$-4-hydroxyphenyl-isopropylamine), is being examined in America. This substance, which was patented in Germany in 1913, may be described as a derivative of tyramine, from which it differs in possessing an extra methyl group. Like ephedrine, it is active on oral administration, a dose of 40 mg. by the mouth causing a rise in systolic and diastolic blood pressures which lasts one or two hours and is accompanied by a slowing of the pulse rate. It differs from ephedrine in having little action on the central nervous system and little spasmolytic action in asthma.[6] According to American workers[7] the pressor effect of paredrine is accompanied by a rise in venous pressure, a fall in the pulse rate, but no change in

[5] *Biochem. J.*, 1940, **34**, 414.
[6] *Amer. J. med. Sci.*, 1937, **193**, 661.
[7] *J. clin. Invest.*, 1940, **19**, 497, 503.

cardiac output. Thus its action on the pulse rate and cardiac output is quite different from that of adrenaline; a rise in both venous and arterial blood pressure has been observed with adrenaline and other sympathomimetic drugs such as veritol, paredrinol, etc. They found that, with the subject "atropinized," paredrine caused a rise, not a fall, in venous pressure; so they concluded that as this could not be due to slowing of the heart by a vagal reflex it was probably caused by constriction of the veins. Paredrine does not produce local vasoconstriction of the skin, and thus will not prolong local anaesthesia. It has little action on the plain muscle of the bronchi or intestine. On the other hand, it causes mydriasis and a shrinking of the nasal mucous membrane. The action of the drug is qualitatively different from that of adrenaline, benzedrine, ephedrine, or tyramine, and appears to be curiously erratic. The value of the pressor action of sympathetic amines in spinal anaesthesia is well established, and in this field paredrine may be found to be better than ephedrine on account of its slighter action on the central nervous system.

## R.A.M.C. IN NORTHERN IRELAND

The presence of members of the R.A.M.C. in Northern Ireland is welcomed by the profession, and arrangements are in hand to extend to them the hospitality of Ulster and to give them an opportunity of maintaining their interest in postgraduate medicine. The relative inactivity of members of the Army Medical Service in recent weeks has contributed to the desire of many to renew their contact with clinical and scientific work and literature. To advance this object a committee (of which the honorary secretaries are Major J. J. M. Brown of the 31st General Hospital and Dr. H. H. Stewart) has been appointed representing the R.A.M.C., Queen's University of Belfast, the Ulster Medical Society, and the Northern Ireland Branch of the British Medical Association. It is hoped that the library facilities of the university, the Institute of Pathology, and the Ulster Medical Society will be available for consultation of and reference to current periodicals and medical literature. The Ulster Medical Society proposes to make the officers of the R.A.M.C. honorary members of the society during their stay in Ulster, and it is intended to hold joint meetings with the British Medical Association, at which discussion on subjects of topical interest would be open to contributions from both civilian and military doctors. The pathological meetings held in the Institute of Pathology for members of the hospital staffs, which have been a popular feature of clinical instruction in the Belfast Medical School, will also be open to visitors, and it is proposed that the staffs (particularly in Belfast) should invite their military colleagues to participate in the clinical work and teaching in the out-patient departments, operation theatres, and on ward routine.

## INFRA-RED PHOTOGRAPHY OF DILATED VEINS

Infra-red waves are not of course perceived by the eye, but their special properties can be used to reveal subcutaneous structures. These waves appear to be reflected by dilated subcutaneous veins, which can be easily detected by infra-red photography with infra-red plates when they are invisible to the eye and in ordinary photographs. B. S. Epstein[1] has used this method in three cases of congenital heart disease, all of which had Fallot's tetralogy (pulmonary stenosis and interventricular septal defect) and presented cyanosis and clubbed fingers. Inspection and an ordinary photograph of the anterior chest wall showed one or two veins to be visible in each case, but infra-red photographs revealed a widespread and complex network of dilated superficial veins. In none of them was there increased venous pressure or other evidence of right heart failure, and the use of this method on patients with rheumatic and other forms of acquired heart disease failed to reveal a similar condition, either with or without venous congestion. The prominence of the superficial venous network is therefore independent of general venous congestion, and it is suggested that, like the cardiac lesion, it is a congenital abnormality. In the cases cited this photographic method was not of any diagnostic value, but might prove to be so for cyanosis of doubtful origin. It is also stated that a similar condition is revealed in the veins of the abdominal wall in the presence of hepatic cirrhosis before ascites has occurred. If it were known to occur fairly constantly, such a relatively early sign of cirrhosis of the liver would be very useful.

[1] *Amer. Heart J.*, 1939, **18**, 282.

## BOMBS OVER LONDON

After three weeks of air-raid warnings and sporadic raids the aerial assault on the capital city of the British Empire opened up in force at 5 p.m. on Saturday, September 7, and has gone on since then with little intermission. Day by day brief official and semi-official announcements of damage done to life and limb, to property and services, have been made by radio and in the newspapers. We are not in a position to add to these reports or to collate them. For us, as for so many others, work goes on under difficulties and is subject to much interruption and delay, and communications are precarious. Readers will understand, and there can be no need to apologize for unintended neglect or default on the part of those who are doing their best to produce and distribute the *Journal* under adverse conditions for which there is no precedent. The bearing and spirit of Londoners under this ordeal have won the applause of all except their enemies. Writing from direct observation we can praise the people who work with and around us for their calm courage and devotion to duty. From every quarter of the metropolis come stories of heroism by doctors and nurses and their fellow-workers in the rescue and casualty services, and these can be matched by accounts that have filtered through from many other cities and towns already attacked. One of the blackest features of the air war on Britain has been the brutal bombing of hospitals. The tale cannot yet be told, but it is common knowledge that a number of hospitals in Central London and the area around have suffered great damage—among them several teaching hospitals of world-wide fame. The fighters of the R.A.F. have done and are doing wonders in counter-attack, and the ground defences are at work day and night, but not even they can certainly protect our scattered medical institutions from the bomber far overhead who recognizes no claim of common humanity.

The Minister of Home Security and the Minister of Health have together appointed a committee to investigate the effect on the public health of the present use of public air-raid shelters. Lord Horder is chairman of the committee, and the other members are Sir Wyndham Deedes, Mrs. Atkinson, Sir Alexander Rouse (Ministry of Home Security), and Dr. B. W. S. Mackenzie (Ministry of Health).

# Nova et Vetera

## A SWEDISH HOSPITAL A HUNDRED YEARS AGO

In *Svenska Läkartidningen* for January 5, 1940, Dr. J. Adams-Ray has published an account of his studies of the records of the Växjö Hospital, which 100 years ago contained fifty beds and was under the administration of a committee responsible for the administration of public funds. The records reveal a level of sanitation at which promiscuous spitting on the floor was already frowned at: witness the purchase in 1839 of two dozen wooden spittoons. In 1835 the medical superintendent asked the committee to grant funds for the provision of hospital clothing for the patients in the place of their own clothing, which "besides being injurious to health, offensive to the sight, dirty, tattered, and infested with vermin, facilitates the unlawful departure from the hospital and the smuggling into it of spirits and unsuitable articles of food. For not infrequently the patients have run away, and have later been found in some tavern, overcome by strong drinks." For some months the committee boggled at this expenditure, but at last consent was given to the desired reform, and the patients blossomed out in a hospital uniform distinguished by blue facings. The caretaker, Holmquist, was everything and did everything. As hospital contractor he was responsible for the commissariat, providing the patients with a dietary on whose quality the committee had occasion to comment in 1838. Holmquist's administrative duties included the emptying of dustbins, accompanying the doctor on his rounds, helping him at operations, changing dressings, and preparing and dispensing medicines.

### Range of Services

The recovery rate in this hospital was remarkably high; of the 377 patients treated in 1838 only eleven died in it. As many as 101 of these patients were treated for syphilis, whereas there appear to have been only a couple of acute abdominal cases in this year—hence, perhaps, the low mortality. According to a decision taken by the committee in 1835, only ten of the beds were to be reserved for non-venereal cases, and there were to be only two beds for accidents. Many of the syphilitics had acquired their disease innocently enough; the records show that the doctors were careful to distinguish between syphilis contracted as a venereal disease and syphilis contracted by other means than sexual intercourse. The treatment for syphilis consisted of either a course of mercury or a dietetic regime whose severity is more than hinted at in the record of the girl Nilsdotter, who "began with the dietetic cure but could not stand it for more than fourteen days."

In 1838 the operations numbered nineteen. The three patients operated on for hare-lip were all discharged cured. Yet one of them was a boy of 14 with a double hare-lip, "the middle portion being retained." An 11-year-old girl was operated on for "hydrorachitis"—a collection of fluid over the os sacrum, found at operation to be cloven. She died three days later, screaming with pain. The only abdominal operation was a "laparocentes" for ascites. Another abdominal case, ending fatally, was that of a 50-year-old crofter for whose intestinal obstruction an enema, a bath, castor oil, and calomel were prescribed. Operative treatment was so little in favour that collections of pus seem never to have been incised; poultices or medicines were also dispensed with, bandages alone being considered sufficient. The patients had to bring their own bandages and dressings—"one skälpund old, fine linen"—as well as two clean shirts. With two exceptions bandaging was the only treatment for fractures. Leeches were prescribed for sprains, as well as "fomentum frigidum."

### No Feasting on Holy Days

The medical superintendent in 1840 suggested to his committee that on holy days the patients should be given special cheer in conformity with the customs of certain other hospitals in the land. The committee regretted that funds did not permit of the proposed change in the hospital dietary. Commenting on the thrifty attitude of the committee in this matter, Dr. Adams-Ray remarks that the finances of the hospital were at times embarrassed by the loans made out of its funds to the members of the hospital committee. If they could not refund what they had borrowed, they could at any rate nip in the bud extravagant schemes for feasting the patients on holy days.

## MEDICAL WAR RELIEF FUND

A committee representative of the British Medical Association, the Royal Colleges, and the Royal Medical Benevolent Fund has decided to establish a special fund for the assistance of members of the profession who find themselves in financial straits as a direct result of war conditions. Already many generous subscriptions have been promised by individual practitioners and Panel Committees. The legal formalities connected with the registration of the fund are nearing completion, and it is hoped to publish next week a fuller announcement and an appeal to the profession as a whole.

# Local News

## INDIA

### Public Health in Bombay

The estimated population of the Province of Bombay is 19,500,000, with 18,000 Europeans and 14,000 Anglo-Indians. The birth rate in 1938, according to the annual report of the Director of Public Health which has just been received, was 38.59 per 1,000, and the death rate 27.85. The birth rate among the Europeans was 13.98 and the death rate 8.38, and among the Anglo-Indians the figures were 15.73 and 9.38 respectively. The birth rate of the province tends to rise and now exceeds all previous records since 1901. An excessive birth rate, says the Director, is not to be welcomed, for it is the most important cause of the high infant mortality (now 174.16 per 1,000 births) and of maternal mortality (5.51 per 1,000), besides being a drain on the health of the mothers and the resources of the fathers. The death rate in Bombay, which is the highest in India except in the Central Provinces, is now only slightly influenced by the epidemic diseases. Influenza and measles caused many deaths in 1938, and measles was a large contributory cause of the high infant mortality. Respiratory diseases showed an increased incidence, as did dysentery and diarrhoea. The cholera incidence in the year under review, for the first time since 1933, was light. The number of small-pox deaths increased, but the case mortality rate indicates that the disease now prevailing is less virulent, mainly owing to the communal immunity that is developing in the populace by vaccination and revaccination. Deaths from plague were reduced to just over 400, compared with five-figure totals in many years previous to 1935. The Bombay Government has ordered that physical education should be compulsory for all children, and that satisfactory medical arrangements should be made for the examination of each pupil in Government educational institutions at the beginning of every year.

### Hospitals in Bengal

The annual report on the hospitals and dispensaries in Bengal shows that in Calcutta there are forty-eight such institutions following the Western system of medicine. There are also three hospitals following the Ayurvedic system and four homoeopathic dispensaries. The number of indoor patients during the year was 74,000. Cases of cholera

numbered close upon 5,000 and those of amoebic and bacillary dysentery 22,500. The largest hospitals in Calcutta are the Eden Hospital for Midwifery, which in the year had 8,626 in-patients, and the Campbell Medical School Hospital, which had 12,586. In the mufassil (provinces) there are altogether 1,533 hospitals and dispensaries following the Western system of medicine, fifty-six of them being State institutions, and there are seventy-six following the homoeopathic system, twelve the Ayurvedic, and five the Unani. Complaint is made of the inadequacy of the nursing arrangements both in Calcutta and in the mufassil. In all the hospitals and dispensaries of the province there are 2,769 medical officers but only just over 1,000 nurses, midwives, and dais (wet-nurses or handy-women). Two expert committees have been appointed by the Government to investigate the possibility of establishing a medical college at Dacca and also a training institution in pharmacy at Calcutta.

### Antirabic Work in India

The second Pasteur Institute in India, which was opened at Coonoor, Madras Presidency, in 1906, has gone on increasing in usefulness until in 1938, 11,703 Asiatics and 287 Europeans were treated. The number of deaths from rabies among all the treated cases was twenty—a mortality rate of 0.17 per cent. The victims in twelve of these fatal cases had not received a full course of treatment, but the others had done so. All the twenty deaths were among Asiatics, and they followed dog-bite in fifteen cases, jackal-bite in three, and fox-bite in two. The appointment of a special research officer has enabled the Institute to undertake research work on rabies on a larger scale than was formerly possible. Experiments are being made with the object of improving the antirabic vaccine now in use. The present vaccine, while satisfactory from the point of view of a low associated mortality among treated cases, is not as good as it might be from the point of view of dosage and duration of treatment.

# Correspondence

## Surgical Treatment of Air-raid Casualties

SIR,—Messrs. A. R. Hodgson and G. K. McKee (August 3, p. 147) raise two very important points that cannot be over-emphasized—namely, (1) the tourniquet is a very dangerous instrument that should never be applied by an unqualified person (or, for that matter, by most qualified persons); and (2) that one must lie flat as soon as the scream of a falling bomb is heard.

For years past I have told first-aid classes that I have still to see a tourniquet applied by a first-aider efficiently or in a case where it was necessary. There are very few wounds where direct pressure and the subsequent application of a pad and firm bandage will not control haemorrhage. If this is insufficient digital pressure may be applied to the main artery at the root of the limb where it can be compressed against bone. There are only three pressure points of any value—namely, (1) where the femoral artery crosses the brim of the pelvis; (2) where the brachial artery runs behind the biceps on the inner side of the humerus; (3) where the carotid artery can be compressed against the transverse process of the sixth cervical vertebra. Efficient pressure on the subclavian artery is difficult and excruciatingly painful, and if that alone will not stop bleeding the wound must be such that the man will die of haemorrhage before anything can be done. Don't forget that the gun's crew are far too busy serving their gun to attend to him, and if the casualty is a civilian his clothes will have to be cut off and this takes a little time. By the time attention is possible the man with a severed axillary artery is dead. I was always taught that it is very rare for anyone to die of haemorrhage from a wound below the knee or elbow.

Another very important point is that a tourniquet must never be applied directly on the skin, as otherwise this is lacerated and subsequently infected. This highly important point is mentioned casually in first-aid manuals, but *all the diagrams show the tourniquet being applied directly on the skin.* I would like to suggest that the use of tourniquets be severely condemned in all first-aid books. Teach the three pressure points and tell the first-aiders to apply digital pressure there for five minutes if nothing else will stop the bleeding. Meanwhile, apply a firm pad and bandage over the wound. If on releasing the pressure bleeding returns, then a tourniquet must be applied by a medical officer *and by no one else.* Until his arrival, pressure must be kept up by relays of helpers, and more cotton-wool and firm bandages must be applied to increase the direct pressure and extend its area.—I am, etc.,

ST. GEORGE B. DELISLE GRAY,
At Sea, Aug. 16. Surgeon Commander R.N.V.R.

## Treatment of Infected War Wounds

SIR,—Mr. Ronald Hare (August 17, p. 235) makes some observations on infected wounds which may assist those who are trying to select from the multiplicity of doctrines and methods of treatment which are preached and practised to-day. Some of these doctrines and methods are revivals from ancient times. We now accept the fact that pus may be laudable, there is a whisper about the revival of carron oil for burns, and we adopt the teaching of Erichsen of half a century ago when he suggested that unpadded plaster could be employed with advantage. Incidentally this great surgeon remarked that in gunshot wounds the plaster occasionally need not be changed, the wound healing without continued pain or fever "under a dry scab." Surgeon Captain Lambert Rogers has drawn attention to an illustration of "the modern" plaster technique dated 1899! The fact is that a description of many of "the new" methods is best sought for in the old textbooks.

Mr. Ronald Hare attributes the successes following encasement in plaster-of-Paris to the post-operative protection given to the wound from the hands and nasopharynx of attendants and to the fact that the wound is sealed by the plaster from air-borne infection carried from septic cases treated near by. He states that the real source of infection—namely, the *Streptococcus haemolyticus* of Group A—rarely is present when the wound is inflicted, and is denied access by asepsis during débridement and by the treatment just mentioned. A long clinical experience supports this view. In hospitals where septic cases were isolated as if suffering from the plague and where asepsis in the wards was made the same religion as it was in the theatre, severe cases of infection were seldom seen. There were opportunities before the war of comparing the results with cases treated in hospital by lax methods during the post-operative period, and the contrast was lamentable.

Fixation is desirable for all infected wounds in the early stages. Any form of effective immobilization combined with infrequent dressings will give equal results; plaster-of-Paris is by no means a *sine qua non.* Prevention of movement lessens the risk of dissemination and gives the local and general rest and comfort which Nature demands. For many years we treated severe infections of the hand and arm by rigid immobilization in gutter splints and avoided arm baths, moist dressings, and movement (*Lancet,* 1936, **2**, 1010). Sometimes a change from the latter to the former treatment gave dramatic results.

As a rule I prefer splints (of the pattern described by Sir Robert Jones) to plaster in the early treatment of the war wounds as I see them. This lesson was learnt in the last war. The Böhler, Winnett Orr, and Trueta methods, however ideal, are not so safe, and are best reserved for a time when skilled assistance is at hand and, above all, when the surgeon is within easy reach and can keep the cases under close personal observation. I have seen lately many minor disasters from the use of primary plaster when applied under adverse conditions. Even when applied by an expert things may go wrong, necessitating removal of an extensive plaster and its re-application. In the case of badly wounded men this is by no means a minor procedure.

Fixation in plaster is excellent when indicated, but familiarity with alternative methods of immobilization will be found very helpful to those dealing with the surgery of to-day.—I am, etc.,

Aberdeen, Aug. 28. W. I. DE C. WHEELER.

## Gun-fire Deafness

SIR,—Surgeon Commander E. R. Garnett Passe's contribution on gun-fire deafness (August 31, p. 295) calls for exemplification of, and comment on, certain points. Having examined a considerable number of these cases, both before and since the outbreak of war—a few of which during the latter period were actually referred to Surgeon Commander Passe for his interest—my records reveal minor differences and may supplement those recorded.

1. The 12-pounder and smaller guns, including rifles and machine-guns, are proportionately the worst offenders. The fact that most cases reporting since the outbreak of war are caused by the 4.7-inch gun is merely because the 4.7-inch gun is the commonest in Naval use. Bombs or shells *exploding in confined spaces* have been responsible for a good number of the cases seen.

2. In almost every case there is a definite history of sudden acute pain in the affected ear, and there is never any uncertainty in the (genuine) patient's story as to the precise moment at which the trauma occurred. This is most important when investigating the attributability of alleged gun-fire deafness.

3. While the majority show varying degrees of nerve deafness, this is by no means universal, and I have seen several cases in which the deafness has been middle-ear in type and in which there was no trace of nerve deafness. This must also be well realized before dismissing a claim to be attributable in the absence of nerve deafness.

4. In my experience visible lesions of the tympanic membrane show none of the regimented regularity which Surgeon Commander Passe describes. I have seen clear-cut and ragged tears, completely punched-out holes, hinged flaps of M.T., and haemorrhagic blebs on most parts of the drum. The commonest is undoubtedly the raised haemorrhagic bleb below the manubrium of malleus, as described, but this is seldom seen without intense inflammation of the pars flaccida and congestion of the vessels along the manubrium of malleus.

5. We cannot be too grateful to your contributor for having drawn attention to the incalculable harm which is done to these affected ears by the introduction of infection through attempted treatment. The resultant suppurative otitis media seems to be far more resistant to treatment than that occurring from other causes. I have under my care at present a casualty of this type dating only from the Battle of Narvik, in which there was almost total middle-ear deafness and destruction of the M.T., following secondary suppuration due to immersion. A radical mastoidectomy showed almost complete necrosis of the ossicles. As I have also had a case of secondary suppuration in which the only treatment given was rectified spirit drops as recommended, I am emphatic that nothing whatever should be introduced into the ear other than a plug of dry cotton-wool lightly applied.

6. In the absence of preventive ear-plugs, which (though normally carried in H.M. ships for the use of gunnery officers and ratings) are at the best of times small, fiddling, and easily mislaid, it should be emphasized that cotton-wool dabbed in vaseline has been proved to give adequate protection. Apart from the obvious added protection which this gives the Naval man in the event of subsequent immersion, it is a combination available in every household, and should have a wider utility in obviating civilian bomb deafness.—I am, etc.,

W. V. BEACH,
Sept. 8. Surgeon Commander, R.N.

## Country Doctors for First-aid Posts

SIR,—It occurs to me that, with the greatly increased bombing of our cities, doctors working in them at first-aid posts and other casualty services must soon be tired out unless they can get away for rest and sleep. On the other hand, there must be many doctors like myself, in country districts, who have not yet had to suffer the strain of air bombardment and who would be only too pleased to take a turn for a week or two at a time.

I am not aware of any Government scheme for dealing with this problem, but as the advantages seem to me so obvious I would be glad if you would give the idea publicity if you think fit. Quite apart from the benefit we might be to our less fortunate brethren, those of us who are in charge of first-aid posts of our own would be greatly assisted by the experience we should gain in case our turn comes.—I am, etc.,

Sept. 10. R. G. MATHEWS, B.M., B.Ch.

## Dosage of Barbiturate Anaesthetics

SIR,—I have read with great interest the letter of Major R. Hastings Moore (September 7, p. 336), in which, for shocked patients, he advocates the use of pentothal anaesthesia and describes his personal experience of its value. However, since he states his doses in volume of solution but omits to state the strength of the solution we still do not know how much drug the patients received. Although with pentothal the strength of solution most commonly used is 5%, it is dangerous to infer this, since during visits to different hospitals in this country and abroad I have seen employed, with equally good results, solutions ranging in strength from 2½% to 20%. I should like to make a plea, therefore, for stating the dose of barbiturate drugs used in weight and not in volume of solution.—I am, etc.,

Department of Anaesthetics, Radcliffe Infirmary, Oxford, Sept. 11. FREDA B. PRATT.

## Large-scale X-ray Examinations

SIR,—Everyone concerned with the medical observation and care of large bodies of men and women, industrial or otherwise, must have followed the recent papers and correspondence on the routine *x*-ray examination of medical students, recruits, and others with the greatest interest. The per thousand ratio of previously unsuspected cases of active pulmonary tuberculosis reported to have been discovered by this means varies very considerably. In Dr. E. L. Cooper's analysis of the findings in 9,000 recruits (August 24, p. 245) the percentage of cases of active pulmonary tuberculosis found is given as 0.55, or 5.5 per thousand. This is considerably lower than has been reported in other series. But it still remains enormously higher than the per thousand rate of actually notified new cases of pulmonary tuberculosis, even if there be added to these such new cases as become known otherwise than by formal notification. Thus in the industry with which I am chiefly concerned, which, if not perhaps typical of the whole community, is numerically the largest in this country, the incidence of new cases of pulmonary tuberculosis in the year 1939 was 0.82 per thousand, the lowest but one in the last twenty years. The highest incidence in these twenty years was not more than 1.8 per thousand, and, taking the twenty years as a whole, there has been a steadily downward trend. During the same period the highest incidence rate of notified new cases of pulmonary tuberculosis for the whole community, England and Wales, was, I believe, not more than 1.9 per thousand, and in this case too the picture over the last twenty years has been that of a declining trend.

For the non-specialist medical observer the question seems to arise, What has been happening in all these years to the extra four or more cases in every thousand which have presumably been occurring but whose presence has not apparently been reflected in the declining incidence rate of actually notified cases? I cannot pretend to write as a specialist on this subject and am really only an inquirer. But is it not possible—presuming the accuracy of the *x*-ray interpretations—that most of these persons have in fact been successfully establishing their own immunity in happy unconsciousness that there was anything the matter with them? Dr. Cooper's figures seem to show, in this connexion, that 54% of his 9,000 recruits exhibited radiological evidence of healed primary tuberculosis. But must there not, in all these cases, have been some period when signs of activity would have been visible had they happened to have been *x*-rayed at an earlier period of life?

As an additional sieve in the examination of recruits for the exceptional wear and tear of Army life large-scale *x*-ray examination has no doubt already proved its value; and everybody would support any measure to control and conquer the incidence of pulmonary tuberculosis generally. But it is profoundly to

be hoped, if the process is to be extended to the normal school, industrial, and social life of the country, that the utmost care will first be taken to learn and assess what is in fact really prognostically significant in these *x*-ray findings; and to avoid unnecessarily labelling and perhaps segregating—with possibly dire psychological consequences to themselves and their families—new hosts of young men and women as cases of pulmonary tuberculosis.—I am, etc.,

London, E.C.1, Sept. 9. H. H. BASHFORD.

## Pulmonary Tuberculosis in Recruits

SIR,—In Appendix III to his paper on pulmonary tuberculosis in recruits (August 24, p. 245) Lieut.-Colonel E. L. Cooper reports the finding of microradiographic evidence of hilar calcification in 54% of his cases. Against this, only 2.3% of my last 700 teleradiographs of tuberculous patients show evidence of hilar calcification, and my experience of staff *x*-rays of "normals" has not appreciably differed from this. The reason for the discrepancy is not far to seek, for in the earlier days of large chest *x*-ray films taken at two or three feet there was considerable distortion and blurring, and reports of calcification were common. The type of large film now procurable shows that most of these "calcified foci" are vessels seen in end elevation. It seems, therefore, that we must be on our guard against this technical retrogression of the microradiograph.—I am, etc.,

The Liverpool Sanatorium, Frodsham, Sept. 10. G. S. ERWIN.

## Rapid Death in Bile Peritonitis

SIR,—A letter from an old pupil has suggested to me that there may be some misunderstanding in connexion with the article published under the above heading by my assistant Mr. D. M. Douglas and myself (August 31, p. 280). My correspondent raised the question of the method of drainage of the duct and the disposition of the tube.

The object of our communication was to draw attention to the potentialities of the escape of bile into the peritoneal cavity, but was not intended to deal with matters of technique. It is only on rare occasions that a tube is introduced into the lumen of the common bile duct.

In the case which was the main subject of our paper the tube was so used because it was proposed to carry out a secondary cholangiography, and for no other reason. At the time of operating it was felt that some bile might escape, but I had confidence that it would find its way along the tube track to the surface and without harm. Years of immunity from the unfortunate consequences which followed dulled my recollection of the reason which induced my old chief, Rutherford Morison, to adopt the transverse incision in biliary surgery. He had seen much of the escape of bile into the peritoneal cavity, and had observed that it usually collected in the pouch now associated with his name, and it was to drain this pouch that his incision was introduced.

Though I usually employ the oblique incision of Theodore Kocher, for years a vertical approach was used; and I know that bile escaping from the common duct can be safely conducted to the surface even though drainage must be uphill. The edges of the incision in the duct are drawn together with one or two stitches, the end of one of these being left long.

A rubber tube about a quarter of an inch in diameter is then prepared by splitting up the end for half an inch; it is then guided down to the duct along the stitch. The split ends are made to lie one on either side of the duct, which is thus straddled by the end of the tube. This method has been employed for years in a number of cases, and without anxiety on account of bile leakage.

Students frequently ask about direct drainage of the common duct by means of a tube passed into the lumen. This I only employ (*a*) if the contents of the duct are obviously and grossly infected; (*b*) if the duct contains a quantity of bile sand or multiple very small calculi such as may easily evade efforts at removal; and, finally, (*c*) on the rare occasions when for some special reasons it is intended to carry out delayed cholangiography.—I am, etc.,

Taplow, Sept. 9. G. GREY TURNER.

SIR,—The interesting discussion by Mr. D. M. Douglas and Prof. G. Grey Turner of a case of bile peritonitis (August 31, p. 280) may be usefully supplemented by referring to our investigations carried out in a case of bile peritonitis (*Zbl. Chir.*, 1927, p. 1922). It has been found that death in this case was caused by an accumulation of bile acids in the tissues—e.g., 22.5 mg. per 100 c.cm. in the heart and 27.2 mg. per 100 c.cm. in the spleen. The bile acids were isolated and analysed by a method described by us in *Arch. exp. Path. Pharm.*, 1926, **117**, 8. These figures were very much like those obtained in dogs whose bile had been made to escape into the peritoneal cavity through an opening in the gall-bladder, an operation which proved fatal within twenty-four to thirty-six hours (*Z. ges. exp. Med.*, 1926, **54**, 795). In these animals the examination of blood and organs yielded large amounts of bile acids, similar to the concentration which was found to be lethal in dogs injected with taurocholic acid.

Apparently in these cases the bile acids are absorbed from the peritoneum into the blood stream, wherefrom they reach the tissues, to be re-excreted through the liver into the peritoneal cavity. In this circle absorption from the peritoneum occurs at a much quicker rate than the re-excretion through the liver cells. This leads to a rise of the bile acid level in blood and organs which finally proves fatal.

These fulminant cases of "cholascos" are the only ones in which death is caused by bile acids—a real "cholaemia."—We are, etc.,

Leicester and Manchester, Sept. 11. F. E. ROSENTHAL. L. WISLICKI.

## Loss of Sleep in Air Raids

SIR,—I can well believe that the contents of this letter will bring storms about my head, but nevertheless I feel that many others of the profession will agree with what I have to say.

During the last few weeks we have had on an average four air raid warnings a day, the final one commencing at approximately 9.30 p.m. and continuing until 3 to 5 a.m. The well-drilled and obedient populace take themselves off to their own shelter if they possess one; if not, to the public shelter.

We all agree that the morale of the civil population is beyond praise, but it is more than distressing to see the results of continuous lack of sleep. Some families compromise by sleeping in their shelters. Well, I am prepared to believe that some of these are constructed in such a manner that hygienic sleeping conditions are adequately assured, but in those that I have inspected this is definitely not so. I can produce endless instances, but one or two will suffice.

*Family No. 1* sleep in their shelter. Mother, father, and two children, ages 9 and 11. Length of shelter roughly ten feet, width six feet, height seven feet. Ventilation is such that in a very short time the atmosphere can be cut with the proverbial knife. The parents are nervy and complain of "acid stomach" and indigestion. The children are shades of their former selves—pale, washed-out faces, dark lines under the eyes, lack of appetite, and irritable tempers. School work naturally suffers.

*Family No. 2* do not sleep in their shelter, but repair to it at each warning. The result so far as their health is concerned is the same as, if not worse than, in Family No. 1.

*Family No. 3.*—Two elderly ladies. School teachers. They live in a top flat and descend to the shelter during night raids. Having had two hours' sleep per night on an average recently their work has suffered to such an extent that one has confided to me that she fears she may lose her job.

One hesitates to criticize the wonderful work of the A.R.P., but I would like to quote a remark regarding casualties in the last war—that it took 5,000 shells to kill one soldier. None of us can prophesy how long the present war will last, but it is said that each one of us in this country is in the front line. Certainly the morale of the people is now excellent, but how long will it continue to be so if lack of sleep—even of repose—is allowed to continue?

In common with most critics, unfortunately I have no definite solution to offer, but in all wars risks *must* be taken. In my humble opinion it is far better to stay comfortably in one's bed during a warning, possibly excepting the occasions when bombs are actually dropping in the near vicinity.

One more point: winter will soon be here with its attendant human ills, which will obviously take heavier toll from a population already debilitated by the causes I have pointed out.—I am, etc.,

Uxbridge, Sept. 8. B. L. HARRISON, E.M.S.

## Biological Bases of Courage

SIR,—The leading article on distrust, fear, and hate (September 7, p. 323) may be supplemented by calling attention to the biological bases of courage. There has been some confusion in thinking in regard to courage, because fighting in the animal world, as well as amongst men, has been looked on as one phenomenon; whereas attack or fight has at least two causes.

For brevity the case may be put thus: (1) An instinct early developed is self-preservation, embracing many manifestations typified by rage or fear, and the responses of flight and fight. The physiological underlying unity is clear in adrenal activity accompanying all and every variation of exhibition. (2) Later in the evolutionary hierarchy the parental instinct develops. This brings a new kind of fighting instinct. It is better to name the accompanying manifestations courage, for sometimes it is not fighting but the deliberate courting of danger by the parent with the aim of protecting the young that is involved. Again, the true physiological nature of the response is proved by the absence of the protective behaviour when the period of care for the young is over (that is, the subsidence of the appropriate hormones). The parent animal—cat, ground-bird, to mention the best-known types—reverts to the self-preservation responses, which more frequently result in flight than fight.

Experience in ourselves bears out this analysis, as indicated in your leader. Timid and nervous people are transformed in their reaction to personal danger when they have some part to play in protecting others, the more helpless the better. For our own morale we cannot aim too high in forgetting about ourselves and helping other people. And since the "stranger within our gates" is entirely dependent on us, spy mania is one of the surest roads to loss of courage. The astute "fifth column" will always try to inject this poison.—I am, etc.,

London, S.W.10, Sept. 8. W. L. CRENDON.

## Vitaminized Bread

SIR,—Your annotation of July 27 (p. 125) shows clearly our genius for compromise, which may yet again land us in serious trouble, this time in the field of nutrition. A Ministerial spell-binder has said that the whole world will watch the "experiment" of vitaminized bread with interest. Have any experiments been done on human beings to find out whether in this synthetic cure all is absorbed in the human intestinal tract? I believe that the mysterious "toxamin" of cereals was sunk on this rock of availability—at least I see no reference to it in recent first-class literature—and either a Government spokesman's talk of an experiment is loose talk or no availability trials have been run.

Clinicians know the enormous doses of synthetic aneurin that have to be given parenterally in the treatment of polyneuritis due to avitaminosis, so the availability of this substance in its synthetic isolated state is not high. It is axiomatic in clinical work that the more soluble the calcium salt the more of it is absorbed, and of the most soluble at least 75% is wasted as it is. The proposal now is to feed the population of Britain on the most insoluble of all calcium salts. Clearly it is important to know if this chalk has been found to be available in the new bread. All the vitamin D in the world will not cause utilization of calcium carbonate if it is not first made soluble, and even then some 75% is wasted. I appreciate the necessity for having wheat offal for farm stock, but I very much fear that this latest attempt at compromise will be an almost useless waste of money.

If availability trials on human beings have been done the result should be made known to the medical profession. If they have not been done the only scientific assumption to make is that this doctoring of white flour is a waste of money and of ingenuity. Mill wheat to 82% to 85% and increase the synthetic A and D in the fat rations. On this matter of scientific feeding our genius for compromise finds its excuse in palatability and custom. Every final-year student knows the answer to the white *versus* brown bread controversy and scientific knowledge should not be subject to compromise.—I am, etc.,

Kingston, Jamaica, Aug. 26. W. E. MCCULLOCH.

## Army Medical Organization

SIR,—I trust that you will be kind enough to allow me the space to reply to certain criticisms and misstatements concerning my book *The Organization, Strategy, and Tactics of the Army Medical Services in War*, which was noticed in your issue of August 10.

Your reviewer, in common with many others, is obsessed by the course of the present war up to date. The sweeping results obtained by the enemy could only have been possible by reason of the demoralization of our allies, and the then limited Air Force at our disposal. These events have led to the assumption that future battles will follow the same course and that the fighting will be confined to tanks and aeroplanes. That this will not be the case is proved by the fact that we are raising infantry divisions, and continue to do so. The infantry is still "Queen of the Battle," and always will be; and it is not to be supposed that we have enlisted some 2,000,000 men to pack them into tanks and aeroplanes, which may conquer ground but which cannot hold it. For these reasons, when we do take the offensive, the medical arrangements for these masses of infantry must necessarily be those outlined, which have been designed for highly mobile warfare, with special arrangements on a smaller scale for mechanized divisions.

Among his criticisms your reviewer states that he was unable, in the index, to find any trace of the words "inspection," "reconnaissance," "liaison," and "conferences," the context implying that these important matters are omitted from the volume under review. Inspection is a peacetime term; in war we speak of reconnaissance, which is repeatedly mentioned—for example, pp. 135, 201, 244, 253, 258, 259, and 260—and is further considered under the heading of "Site" in every chapter of Part II. In particular I would draw attention to the quotation from *Field Service Regulations* on page 128: "Time spent on reconnaissance is rarely wasted." Another alleged omission is that of liaison. The remarks as to its practical importance in the review show that your contributor is not aware of the more usual terminology, "co-operation," which is in accordance with the discussion on the principles of war in *Field Service Regulations*. The importance and vital necessity of this co-operation, or liaison if you will, are stressed almost *ad nauseam* in nearly every chapter, and a full discussion of this paramount principle will be found on page 15, which is repeated on page 240. Your reviewer writes: "Conferences would form the heading of a useful paragraph." Let him turn to page 272, where he will find it.

One omission is freely acknowledged, and that is the contraindication against carrying certain surgical cases by air transport. Any such purely surgical matters are beyond the scope of a book on administration.

A further error in the use of military terms is where the writer refers to administrative instructions: these are now called administrative orders, the former being in use in the last war. The statement that, "... in war, medical departments of the staff should never issue operation orders" is at variance with the official doctrine, as laid down in *Field Service Regulations* and in *R.A.M.C. Training*, by which the author of this book is necessarily bound. Reference to Vol. I, p. 428, and Vol. II, p. 82, of the *Official History of the Great War* will show actual examples of such orders, and will demonstrate that the complicated arrangements for a great battle can be dealt with in no other way. So much for higher formations. It is not always realized that the A.D.M.S. of a division plays a double part: not only does he act as the commander's medical staff officer, and as such drafts the medical paragraphs for insertion in administrative orders, but he is the officer commanding his medical units, and therefore he has to issue orders as does any other commanding officer. Orders are not lengthy, or should not be; those for divisional medical units can be written on the back of a postcard: written orders prevent mistakes, and fix the responsibility for any such.

The entire aim and object of the book has been misinterpreted. It was not intended that officers should carry round this volume for reference in the field. Nor is it necessary, for this has been provided for by the official publications, the *Field Service Pocket Book* and the *Field Service Manual, Medical Services*. It is to be hoped, however, that no medical officer will be sent on active service till he knows his work, or else he will be in like case with your reviewer's hypothetical surgeon. To stigmatize the book as academic is thoroughly unfair; in any case it is not the opinion of the late Director-General, as may be seen from his foreword. It is stated that one cannot learn medical administration from a book. If this be so, why does the War Office publish *R.A.M.C. Training* and a host of other manuals? How else are we to learn? In peacetime medical units do not exist, and in war one's practical experience is too often only that of the units in which we are serving or of those with which we are in immediate contact. All said and done, your reviewer's surgeon would not make much of his first appendix if he had not read it up in the first place.—I am, etc.,

Allestree, Derby, Sept. 9. T. B. NICHOLLS.

## The Nature of Disease

SIR,—Some of the remarks in your review (September 7, p. 320) of Mr. J. E. R. McDonagh's latest work seem hardly called for. If Mr. McDonagh is right, must "all the body of workers" (physicists, chemists, biochemists, physiologists, etc.) be wholly wrong, and so place us all under the absolute necessity of leaving the "comfortable habitation" built up for us by them? Would it not suffice to receive some of the new furniture suggested by Mr. McDonagh, and change the aspect and interior of the house and rooms somewhat, retaining all that is known to be sound in the foundation? Or add another storey to the structure? Is it fair to bracket his carefully constructed scientific production, on the accepted lines of modern chemotherapy, of remedies designed to secure a definite purpose—how remote that is from empiricism!—and proved over and over again by many doctors to achieve it, with what you call the "preposterous grounds" of the advocacy of valerian?

Mr. McDonagh's work covers ground exactly opposite to that of empiricism. Take the creation and use of S.U.P. 36 as an example. His theory, by which he constructed it, is right; it achieves what it was intended to achieve in the way intended, as those who have tried it know. Again, the other argument that has been advanced in his favour is that "great discoveries of the past were for a time rejected," and you add that the corollary to that is "that if a theory is not accepted it *must* be true" (the italics are mine). Who ever did suggest such a corollary? It is justifiable, however, surely, to say it *may* be true, and that the facts involved require unbiased investigation, if they are worthy of it.

Medicine does not require to be rebuilt, as you suggest, on account of Mr. McDonagh's views. It might well be the better for overhauling and remodelling. It is notorious that our profession is slow to take up new ideas—admitted often wisely so, if criticism and inquiry are fairly carried out. I discussed a year or two ago Mr. McDonagh's views with a well-known teacher of medicine (not now in Glasgow), who rejected them all rather acrimoniously and vigorously. To my inquiry he had to admit he had never seen Mr. McDonagh's volumes on the *Nature of Disease*, far less read them. Such is too often the attitude of too many members of our profession to new ideas. And those they do adopt they frequently do not seek to understand, but simply use them.

Mr. McDonagh's works will be found by anyone taking time to study them from the beginning as most stimulating to the mind and helpful to a broader conception of, and renewed interest in, many of the problems and gaps presented by our present knowledge of the nature of disease. To a man who has read sufficiently the classic textbooks on diseases of this and disease of that, all the different chapters on diseases of the liver, the stomach, the heart, the kidneys, the brain, the skin, and so forth, Mr. McDonagh comes as a welcome relief, conveying the thought that the unification and correlation of disease, as near as possible in any and every part, under a common factor, is well worth proving or disproving in an adequate manner by those whose ability and opportunity enable them to do it.—I am, etc.,

Glasgow, Sept. 12. R. O. ADAMSON.

## Cereals and Rickets

SIR,—With reference to your annotation on the above subject in your issue of August 31 (p. 292), I may mention that in the *Edinburgh Medical Journal* (1940, **47**, 204) I deal with this and cognate matters. In these circumstances, all that will be necessary here will be to set down briefly my views on the main issues, more or less as stated there.

The available evidence goes to show that rickets, characterized in the bones by overgrowth without calcification, is due to a lack of available phosphate; and that lack of available calcium produces osteoporosis, a condition consisting essentially of atrophy and decalcification of fully formed and fully calcified bone. In his article on perspectives in biochemistry (1937), speaking of adult dogs fed on a cereal ration, Mellanby remarks that the ingestion of the toxamin ("cereal factor") deprived the bones of their stores of calcium and made them soft and deformed. The condition, thus described as occurring in one of his crucial experiments, is beyond any dispute osteoporosis, not rickets.

The diet of the dogs employed by Mellanby in the experiments of his 1921 and 1925 reports was markedly deficient in calcium. The illustrations in his report of 1925 show that the condition produced by his diet was osteoporosis, not rickets, and that the administration of cod-liver oil had no beneficial effect, so far as histological evidence is concerned, on this condition. The so-called toxamin or cereal effect is therefore, in my opinion, nothing more than osteoporosis, due to the well-recognized lack of calcium in cereals—a state of affairs, be it said, capable of giving rise to the condition even if the whole of the calcium were absorbed and none of it rendered insoluble and put out of action by phytic acid.

I have shown elsewhere that osteoporosis, so produced, is unaffected by the administration of cod-liver oil. The administration of calcium in more than ample but still medium quantity as the salts of organic acids, especially the carbonate, due to the alkalosis brought about, gives rise to osteoporosis, remediable, however, by the administration of vitamin D. Calcium salts of the strong acids, such as $CaCl_2$, by the production of acidosis bring about osteoporosis also, but whether this is antagonized by vitamin D I do not know.

The fact that for many generations oatmeal porridge and milk constituted much of the staple diet in Scotland would seem to show that calcium in milk exists in a form and milieu appropriate for metabolism, a conclusion for which there is direct evidence in observations made by me on lambs, pigs, and calves.

It would be interesting to know why so many of the "war" dietaries can recommend this dangerous substance oatmeal as a major foodstuff; and this without attention being specifically drawn to its age-long dietary association with milk in its home of origin (not, as elsewhere, with sugar, syrup, treacle, and other such materials).—I am, etc.,

Aberdeen, Sept. 3. J. P. MCGOWAN.

## Injection Treatment of Muscular Rheumatism

SIR,—Referring to Dr. M. G. Good's letter (September 7, p. 339) I have during the last few years used a great many different methods of injecting local anaesthetics for rheumatic pain and muscle spasm, including impletol, novocain in massive doses, proctocaine, and procaine. As a result of these various trials the technique standardized at the Charterhouse Rheumatism Clinic as being the best is the injection of 2 c.cm. of 0.25% procaine into each of the acutely tender and closely circumscribed areas which have been described in detail by Dr. Good (*Brit. J. phys. Med.*, 1938, **1**, 302; 1940, **3**, 46). I can confirm his original finding that the same result is obtained by light friction under heat but at the expenditure of a great deal of time.

Temporary exacerbation may follow the procaine injections, and the procedure may have to be repeated two or three times if the tender areas are widespread, but the end-

result is satisfactory in the great majority of cases. Muscle spasm is relieved as well as pain, and flexion deformity is often much reduced. It is therefore of value not only in non-articular rheumatism but also in cases of quiescent infective arthritis and of osteo-arthritis.—I am, etc.,

London, W.1, Sept. 6. H. WARREN CROWE, D.M., B.Ch.

## Counter-irritation over the Spinal Cord

SIR,—Mr. D. S. Hayton-Williams's communication on dental disease in pregnancy (September 7, p. 338) recalls to memory the fact that many years ago Harkin of Belfast drew attention to the beneficial results obtained from applying counter-irritation over the spinal cord in certain conditions. Among these were neuralgia and other morbid states occurring in pregnancy. He was unable to explain the exact rationale of the treatment, and declined the responsibility of determining whether it produced hyperaemia and thus removed congestion; whether through the agency of the vasomotor nerves constriction or expansion of the blood vessels was induced; or whether the sympathetic system was called into action by the stimulation of the fine network of peripheral nerve distribution. The part of the spine to which the counter-irritation is applied is that covered by the bodies of the fourth and fifth dorsal vertebrae.

Being desirous of obtaining from a leading neurologist a scientific explanation of the existence of this limited area of latent hyperaesthesia with nerve disorder in remote parts, Harkin wrote to Brown-Séquard requesting the favour of his opinion on the point, and received in reply a communication in which he said: "Why it is that some parts are more particularly attacked with vasomotor spasm and others with vasomotor paralysis we do not know, and therefore I cannot answer your question, but I can say that the morbid sensibility of the spine at the level of the fourth dorsal and of the seventh cervical is a sign of anaemia and hysteria, so that persons in health are free from it." With reference to this subject I might quote a case which came under my treatment. It was a woman aged 39, 8-para, four months pregnant, who had been troubled with severe facial neuralgia for three weeks. After counter-irritation had been applied for six hours over the spinal area referred to the pain entirely disappeared and never returned.—I am, etc.,

Portsmouth, Sept. 9. JOHN R. KEITH, M.D.

## Staphylococci in Lobar Pneumonia

SIR,—In your issue of March 30 (p. 543) is an account of a meeting of the Manchester Pathological Society at which Dr. Luxton referred to a case of pneumonia which failed to respond at all to sulphapyridine and in which staphylococcus was found in pure culture in the blood and sputum. In January last an Englishwoman at Suez died from lobar pneumonia after only three or four days' illness. On arrival at Cairo for the funeral her husband was taken ill with typical lobar pneumonia, from which he died three days later. Both cases failed to respond to "dagenan" (sulphapyridine).

I was surprised to find the man's sputum, when examined microscopically, to be packed with staphylococci and giving a pure culture of haemolytic *Staphylococcus aureus* on culture. A blood culture was found sterile. It would seem that staphylococcus can give rise to a peculiarly fulminating lobar pneumonia.—I am, etc.,

Public Health Laboratories, Cairo, June 19. B. R. SANDIFORD.

## Intussusception

SIR,—I have read with much interest Dr. Bruce Williamson's report on a case of intussusception in a child and his comments thereon (September 7, p. 320). He has shown the value of repeated palpation of the abdomen for the tumour, which is only present and palpable when the bowel is contracted. He rightly emphasizes that the diagnosis should not be delayed until the passage of blood and mucus, which should be regarded as late signs, and an indication that an advanced stage of inflammation is present.

In addition to repeated abdominal palpation I would like to stress the value of an *x*-ray examination of a barium enema. By this means a definite diagnosis can be obtained in cases which are doubtful clinically. In early cases the examination may also be therapeutic in that the enema may produce complete reduction of the intussusception. The technique is familiar to all radiologists, but I would emphasize the following points:

1. The enema should be introduced and its rate of flow controlled personally by the radiologist under screen control.
2. Low pressure and a slow rate of introduction of the enema are essential if the colon is to tolerate the enema and not reject it as soon as the rectum and sigmoid are filled.
3. When the typical appearance of an intussusception is found a gradual increase of pressure of the enema combined with gentle palpation may produce complete reduction of the intussusception provided the examination can be carried out before the onset of the late stage, as shown by the passage of mucus and blood.—I am, etc.,

Hertford, Sept. 11. CEDRIC HILLIARD, M.B., D.M.R.E.

## Results of Immunization against Diphtheria

SIR,—Dr. Ralph Weaver (September 14, p. 366) claims a "spectacular fall" in the incidence of diphtheria in Brisbane as the result of artificial immunization. He bases his claim on: (1) the immunization of 13,327 children in the space of two and a half years out of a total population of 326,000; (2) the fact that during the first half of 1940 the incidence of diphtheria was very much less than during the two preceding years 1939 and 1938. It is unfortunate that Dr. Weaver does not give the figures for diphtheria incidence over a much longer period. Two years is much too short a period to be of real value, as also is the half-year during which the incidence has been lower. Moreover, the number of children immunized is much too small: 13,327 children in a total population of 326,000 is probably less than 15% of the child population at risk, and expert opinion is practically unanimous that a substantial majority of the child population must be immunized before results can be expected.

I am certainly not opposed to artificial immunization against diphtheria, but I think it a pity that results should be claimed on insufficient evidence.—I am, etc.,

Leicester, Sept. 14. C. KILLICK MILLARD, M.D., D.Sc.

## First-aid Lectures

SIR,—The subject of first-aid lectures interests me especially because for over three years as medical officer to the Sussex 78 Branch of the British Red Cross I have been lecturing and taking examinations in first aid. For the regular member of the Red Cross the manual is good, but for A.R.P. candidates it is much too comprehensive. As I have had to lecture to the latter class as well I have adopted a new method.

I give six lectures and take up a special region of the body at the first five. The first lecture is devoted to the arm—the essentials of the anatomy: blood vessels, bones, joints, etc.—and then I immediately follow on with the accidents to that limb and the way to deal with them, stressing haemorrhage, fractures, and injuries to joints. The next lecture deals with the leg in the same way; after that the chest, the abdomen, the head and spine; and the sixth lecture deals with wounds, burns, asphyxia, unconsciousness, and any other subjects I think of chief importance. I find these lectures are enjoyed by the candidates and the subject-matter remembered by them in a very satisfactory way.—I am, etc.,

CONSTANCE B. SLATER,
Worthing, Sept. 14. Surgeon, B.R.C.S.

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The British Standards Institution (28, Victoria Street, S.W.1) has issued a standard for tests for laboratory porcelain. The tests included are: appearance, shape, weight, etc., porosity of body and imperfections in glaze, resistance to heat and sudden change of temperature, constancy of weight, and resistance of glaze to high temperature and resistance of glaze to acid and alkali.

# Obituary

## R. TANNER HEWLETT, M.D., F.R.C.P.

Emeritus Professor of Bacteriology, King's College, University of London

We regret to announce that Prof. Richard Tanner Hewlett, the well-known bacteriologist, died at his home in Greenwich on September 10 at the age of 75. He had been vice-president of the Section of Bacteriology at the Annual Meeting of the British Medical Association in 1912.

The son of Richard Hewlett, solicitor, he was born in London in 1865, and was educated at King's College School, London, entering the Medical Faculty of King's College in 1883 and gaining there a junior scholarship and two senior scholarships. He graduated M.B. of London University, with honours in forensic medicine, in 1890, and proceeded to the M.D. in 1892. He took the D.P.H. of the English Colleges in 1896 and was elected F.R.C.P. in 1906. After holding house appointments at King's College Hospital he was demonstrator of bacteriology in King's College for three years, bacteriologist to the Jenner Institute of Preventive Medicine (now the Lister Institute) from 1894 to 1901, and then returned to King's as head of the department of bacteriology with the title of professor. On retiring from that post in 1925 he was appointed emeritus professor of bacteriology in the University of London.

Prof. Tanner Hewlett was connected for many years with the Seamen's Hospital, Greenwich, first as physician, then as director of pathology, and afterwards as consulting pathologist. During the last war he had been pathologist to the Richmond War Hospital; he was also for more than thirty years lecturer in bacteriology at the London School of Tropical Medicine. In 1909 he delivered the Milroy Lectures before the Royal College of Physicians on "Disinfection and Disinfectants." His very successful *Manual of Bacteriology* went through nine editions, and his *Students' Manual of Pathology* five editions; he also wrote books on *Serum and Vaccine Therapy* and on the *Principles of Preventive Medicine*. He became honorary secretary of the Royal Microscopical Society in 1932.

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In a year which included many brilliant men among its students EVELYN MARY HOLMES, who has just died at the age of 41, was a great asset to the band of women who entered Owens College, Manchester, just before the close of the last war. She was awarded the Dauntesey Medical Scholarship, and her brilliance soon put her in the forefront of her colleagues, and led us to predict for her an outstanding career. After qualifying she was senior orthopaedic house-surgeon at the Ancoats Hospital, Manchester, and later held appointments at the Shropshire Orthopaedic Hospital and the Morland Clinics at Alton. As a research scholar she spent a glorious year in Stockholm and Canada, studying tuberculosis treatment indefatigably, and making friends. Several years ago she published a paper on cultural methods in the diagnosis of tubercle which attracted a good deal of attention. She then became assistant medical officer at the Scotton Banks Sanatorium, Knaresborough, after which she decided to try general practice, but found time to write a thesis, and received her degree of M.D. early this year. All this she achieved with the handicap of constant and serious ill-health, and it was only amazing energy and indomitable will-power which kept that slight frame at work in spite of all advice and obvious unfitness. Through the bad weather of the winter of 1939 she struggled to carry out the duties she had undertaken, until she all but died standing. I think this would have been her wish, but as it was she was at work up to four days before her death. She had a quietly radiant personality, and although she had only been in practice so short a time her gentleness and skill had quickly won her the affection and gratitude of her patients, while medical colleagues recognized her outstanding ability and deep conscientiousness. Hail and farewell. B. C.

Dr. JOHN ORTON of Sherbourne Priors, Warwick, died on September 4. He had been living in retirement for some time. Dr. Orton received his training at Queen's College, Birmingham, and at Josiah Mason's College, to which latter in 1892 the medical department of Queen's was transferred, and he qualified M.R.C.S., L.R.C.P. in 1893, taking the D.P.H. in 1897, and the M.D. of Birmingham in 1902. After house appointments at Queen's Hospital, Birmingham, he practised in the Midlands, holding various public appointments until becoming regional medical officer of the Ministry of Health. Dr. Orton was interested in the St. John Ambulance Brigade, of which he was assistant commissioner for Warwickshire. He was also an examiner for the St. John Ambulance Association, and a Knight of Grace of the Order of St. John of Jerusalem. During the last war he served as major R.A.M.C.(T.). He became a member of the British Medical Association shortly after qualification, and was an active worker for many years in the Birmingham Branch, of which he became president in 1915–16. He served as a representative of his Division at the Annual Meetings of the Association in 1914, 1916, and 1919, and he was a member of the Central Ethical Committee for one year, 1919–20. He was also prominent in the Society of Medical Officers of Health and a past-president of the Midland Branch of that Society. He was a J.P. of the city of Coventry. Dr. Orton will be long remembered in the Midlands for much useful public service and service on behalf of his profession.

We regret to announce the death on September 3 at her sister's house near Northampton of Dr. MAY GRANT WILLIAMS of Thurloe Court, S.W., medical officer to the Lady Gomm Dispensary, Rotherhithe, and formerly anaesthetist to the Elizabeth Garrett Anderson Hospital and to the out-patient department of the Hospital for Sick Children, Great Ormond Street. Her father was the late Cecil Gwyer of Petrograd, and in 1896 she married Brigadier-General Sydney Frederick Williams, C.M.G., R.E. Entering the London School of Medicine for Women much later than most students, she obtained the M.R.C.S., L.R.C.P. diplomas in 1921, and joined the British Medical Association immediately after qualification.

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The following well-known medical men have died abroad: Dr. J. T. FOTHERINGHAM, emeritus professor of the history of medicine at Toronto University, aged 79; Dr. ARTHUR STEPHEN HAMILTON, professor of nervous and mental diseases at the University of Minnesota Medical School, aged 67; and Dr. GERTRUD JACOBS, a leading psychiatrist and psycho-analyst of the Washington–Baltimore area, aged 47.

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The annual medical report of the Royal Samaritan Hospital for Women, Glasgow, is wholly a statistical tabulation. The total number of patients dealt with during 1939 was 2,935, and a detailed analysis was given of the pathological conditions encountered in each of these patients and of the character of the 2,671 operations performed. A brief note is also made of each of the 33 fatal cases. The total number of cases in which infection associated with child-bearing was an aetiological factor was 576, and the number in which it was unassociated was 416. Injury as an aetiological factor was associated with child-bearing in 1,043 cases. New growth was present in 613, and errors of development appeared in 187. These tables give for each small group of conditions treated the average age of the patient, the condition as to marriage and parity, the length of stay in hospital, the presence or absence of additional lesions, the number of miscarriages, the time since the previous pregnancy, and other details. The average ages of the patients treated for the various conditions are given. Thus of 617 cases of cervical erosion the average age was 34; of 117 cases of multiple fibromyomata of the uterus the age was 43; of 250 cases of prolapse of the uterus the age was 50; and of 262 cases of cystocele and rectocele the age was 45.

## EPIDEMIOLOGICAL NOTES

### Infectious Diseases for the Week

During the week under review there has been a decline in the incidence of all the principal infectious diseases with the exception of diphtheria. But, compared with last year, notifications are higher for diphtheria, scarlet fever, enteric fever, cerebrospinal fever, acute poliomyelitis, and probably measles, to judge from the number of deaths.

### Diphtheria

Only ten of the administrative health areas in England and Wales were free from the disease—namely, the counties of Cambridge, Cumberland, and Westmorland, and the small areas of Isle of Ely, Soke of Peterborough, and the Welsh counties of Cardigan, Carmarthen, Montgomery, Pembroke, and Radnor. The great towns had most of the cases, but figures were also high in a few urban and rural districts. Details of notifications in these centres are: Lancaster 155 (Liverpool 38, Manchester 16, Wigan 14, Chorley 12, Oldham 6); Yorks, West Riding 88 (Sheffield 19, Huddersfield 7, Bradford 5, Harrogate M.B. 4); Glamorgan 81 (Swansea 26, Cardiff 15, urban districts of Rhondda 6, Aberdare 5, Mountain Ash 5); London 51 (6 each in the boroughs of Hackney, Stepney, and Wandsworth); Gloucester 43 (Bristol 23, Gloucester 10, Cheltenham M.B. 8); Devon 40 (Exeter 4, Plymouth 31). Although the numbers notified in Scotland are fewer than the previous week, diphtheria is over three times more prevalent than in the corresponding week of last year. The areas chiefly affected are the burghs of Glasgow 115, Edinburgh 30, Dundee 27, Aberdeen 15, and the counties of Renfrew 15, Lanark 13, Perth and Kinross 13, Fife 11, Dumbarton, and West Lothian, 7 each.

### Enteric Fever

The total notifications came from over twenty-five areas, or fewer than 5 cases per area. In only three were there more than 10 cases during the week—namely: Lancaster 33 (Manchester 10, Blackburn 3, Liverpool 2, and 1 each in Blackpool, Bolton, Salford, and Warrington; the remaining 14 were widely scattered over eight urban districts and one rural district); Durham 13 (Gateshead 2, Hartlepool M.B. 1, urban districts of Whickham 3, Ryton 2, and 1 each in Blaydon and Houghton-le-Spring, and the rural districts of Barnard Castle, Easington, and Lanchester); Northumberland 11 (Tynemouth C.B. 1, Berwick-upon-Tweed M.B. 3, and the urban districts of Newbiggin-by-the-Sea 4, Ashington 2, and Bedlingtonshire 1). In Scotland there were 1 case of typhoid fever in Ayr county and 10 of paratyphoid B fever in the counties of Aberdeen 3, and Berwick, Lanark, and Midlothian 1 each, and the burghs of Glasgow and Ayr, 2 each.

### Acute Poliomyelitis

Although acute poliomyelitis was recorded in fourteen areas, less than one-half of the total occurred in two counties and affected rural as much as urban districts. In order of incidence the areas involved were: Lancaster 8 (Bolton 3, and 1 each in Barrow-in-Furness, Blackpool, Warrington, Chadderton U.D., and Ulverston R.D.); Stafford 6 (Wolverhampton 4, Tamworth M.B. 1, Seisdon R.D. 1); Yorks, West Riding, 4 (Leeds 2, Knaresborough U.D. 1, Sedbergh R.D. 1); Hereford 2 (in Hereford M.B. and R.D.); Warwick 2, in Birmingham; 1 each in Chester (Congleton M.B.); Cumberland (Penrith R.D.); Durham (South Shields); Middlesex (Hayes and Harlington); Notts (Hucknall U.D.); Somerset (Minehead U.D.); Southampton (Winchester R.D.); Worcester (Kidderminster M.B.), and Glamorgan (Cardiff). The Scottish cases were recorded in Glasgow 2, Ayr C. 1.

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J. J. Quinlivan (*New York State J. Med.*, 1940, **40**, 1029) records an outbreak of 105 cases of Flexner bacillary dysentery in a boys' summer school with a population of 340. A raw milk supply was the vehicle of infection. There was evidence to incriminate one or more milk handlers as the source of contamination.

No. 35

## INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended August 31, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

*Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for:* (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

| Disease | 1940 | | | | | 1939 (Corresponding Week) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (a) | (b) | (c) | (d) | (e) | (a) | (b) | (c) | (d) | (e) |
| Cerebrospinal fever | 111 | 7 | 21 | | 2 | 18 | 1 | 3 | | 1 |
| Deaths | | 1 | 4 | | | | 1 | — | | |
| Diphtheria | 908 | 51 | 325 | 21 | 16 | 756 | 50 | 104 | 36 | 35 |
| Deaths | 20 | — | 12 | — | 3 | 14 | — | 4 | 2 | 3 |
| Dysentery | 66 | 1 | 49 | | 1 | 26 | 4 | 7 | | — |
| Deaths | | | — | — | — | | | — | — | — |
| Encephalitis lethargica, acute | 2 | — | 1 | | — | 1 | — | 1 | | — |
| Deaths | | 1 | 1 | | | | 2 | 2 | | |
| Enteric (typhoid and paratyphoid) fever | 122 | 6 | 18 | 3 | 1 | 77 | 6 | 11 | 5 | 2 |
| Deaths | 1 | — | — | — | — | 1 | — | 1 | — | — |
| Erysipelas | | 18 | 48 | 2 | 2 | | 1 | 50 | 4 | 3 |
| Deaths | | 1 | 1 | | | | | — | | |
| Infective enteritis or diarrhoea under 2 years | 27 | — | 11 | 12 | 11 | 44 | 6 | 12 | 16 | 11 |
| Deaths | | | | | | | | | | |
| Measles* | 5,912 | 68 | 274 | | 52 | | | 20 | 2 | 3 |
| Deaths | 8 | — | 2 | 1 | 1 | 2 | — | — | — | — |
| Ophthalmia neonatorum | 85 | 5 | 27 | | 1 | 78 | 4 | 6 | | — |
| Deaths | | | | | | | | | | |
| Pneumonia, influenzal† | 312 | 19 | 4 | — | 6 | 301 | 21 | 5 | 1 | 2 |
| Deaths (from influenza) | 6 | — | — | — | — | 8 | 1 | 1 | — | — |
| Pneumonia, primary | | | 118 | 3 | | | | 58 | 7 | |
| Deaths‡ | | 19 | | 5 | | | 5 | | 9 | |
| Polio-encephalitis, acute | 4 | — | | | | 1 | — | | | |
| Deaths | | — | | | | | — | | | |
| Poliomyelitis, acute | 31 | — | 3 | | — | 21 | 3 | — | | — |
| Deaths | | — | — | | | | — | — | | |
| Puerperal fever | 4 | 4 | 16 | — | 2 | 3 | 3 | 8 | 1 | — |
| Deaths | | — | | | | | 1§ | | | |
| Puerperal pyrexia | 124 | 13 | 13 | | — | 146 | 11 | 8 | | 1 |
| Deaths | | | | | | | | | | |
| Relapsing fever | — | — | | | — | — | — | | | — |
| Deaths | | | | | | | | | | |
| Scarlet fever | 1,194 | 37 | 150 | 30 | 34 | 1,035 | 98 | 136 | 41 | 55 |
| Deaths | 1 | — | — | — | — | 3 | — | — | — | — |
| Small-pox | — | — | — | — | — | — | — | — | — | — |
| Deaths | — | — | — | — | — | — | — | — | — | — |
| Typhus fever | — | — | — | — | — | — | — | — | — | — |
| Deaths | | | — | — | — | | | — | — | — |
| Whooping-cough* | 970 | 9 | 75 | | 8 | | | 36 | | 5 |
| Deaths | 7 | — | 1 | 1 | 2 | 8 | 4 | 1 | — | — |
| Deaths (0-1 year) | 258 | 24 | 52 | 31 | 26 | 225 | 33 | 53 | 30 | 17 |
| Infant mortality rate (per 1,000 live births) | | | | | | 36 | 30 | | | |
| Deaths (excluding still-births) | 4,173 | 652 | 511 | 151 | 116 | 3,656 | 644 | 518 | 185 | 118 |
| Annual death rate (per 1,000 persons living) | | | 10.3 | 10.1 | 10.2 | 9.0 | 8.3 | 10.5 | 12.4 | 10.4 |
| Live births | 5,158 | 730 | 822 | 388 | 214 | 6,893 | 1,222 | 858 | 311 | 210 |
| Annual rate (per 1,000 persons living) | | | 16.6 | 25.9 | 18.7 | 16.9 | 15.7 | 17.4 | 20.9 | 18.4 |
| Stillbirths | 200 | 24 | 38 | | | 234 | 40 | 38 | | |
| Rate per 1,000 total births (including stillborn) | | | 44 | | | 33 | 28 | 42 | | |

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

§ Death from puerperal sepsis.

# Universities and Colleges

## UNIVERSITY OF LONDON

### *Recognition of Teachers*

The following have been recognized as teachers of the University in the subjects indicated in parentheses:

*University College:* Dr. R. J. O'Connor (Anatomy). *London Hospital Medical College:* Dr. R. R. Bomford (Medicine); Mr. Arthur Lister (Ophthalmology); Mr. Hermon Taylor (Surgery). *St. George's Hospital Medical School:* Dr. W. M. Levitt (Radiology). *Middlesex Hospital Medical School:* Dr. C. A. Keele (Pharmacology); Dr. J. E. Roberts (Physics as applied to Medical Radiology); Dr. B. W. Windeyer (Radiotherapy). *St. Mary's Hospital Medical School:* Dr. F. Himmelweit (Bacteriology). *London (Royal Free Hospital) School of Medicine for Women:* Dr. P. E. T. Hancock (Medicine); Dr. Lilian M. Dickson (Anatomy); Dr. Winifred A. Leyshon (Physics). *London School of Hygiene and Tropical Medicine:* Dr. F. Murgatroyd (Tropical Medicine). *Royal Dental Hospital of London School of Dental Surgery:* Mr. I. H. Hovell (Dental Anatomy and Dental Surgery).

### *Sanderson-Wells Lecture*

It was reported at a meeting of the University Court on July 3 that Dr. Sanderson-Wells, who last autumn founded prizes in the pathology and physiology of food (see *London University Gazette*, February 21, p. 3), had offered to endow a lecture, to be known as the Sanderson-Wells Lecture, and to be given at such intervals as the University might decide, on some subject of moment bearing upon "The Nature, Causes, and Cure of Human Ailments, with Special Reference to Soil Fertility, Tissue Resistance, Food, Health, and Disease." The offer was accepted and the cordial thanks of the University have been conveyed to Dr. Sanderson-Wells.

### *Awards*

London Inter-Collegiate Scholarships Board awards of medical entrance scholarships and exhibitions have been made on the results of the Board's examinations as follows:

UNIVERSITY COLLEGE.—*Medical Scholarship:* D. R. Wilkie. *Bucknill Scholarship:* P. A. Reed. *Medical Exhibitions:* G. F. Bacon, J. V. Ellis.

KING'S COLLEGE.—*Warneford Scholarships:* Joy M. Douglas, D. K. M. Toye. *Sambrooke Scholarships:* C. R. B. Vincent, P. T. Clover.

KING'S COLLEGE HOSPITAL MEDICAL SCHOOL.—*Science. Scholarship:* T. A. Richards.

An additional second medical examination for internal and external students will be held in December, 1940, beginning on Monday, December 2. Entries must be received not later than October 28.

The University of Lucknow has been added to the list of institutions from which the University receives certificates for the complete course preparatory to the M.B., B.S. degrees for external students.

The Royal Hospital, Wolverhampton, has been recognized for a further period for the purposes of the Diploma in Clinical Pathology for external students.

The Ph.D. degree in the Faculty of Medicine (non-clinical) has been conferred on W. P. Rogers (London School of Hygiene and Tropical Medicine) for a thesis entitled "Studies on the Biology of Certain Parasitic Nematodes, with Reference to its Bearing on the Problem of Disease Prevention and Control."

## UNIVERSITY OF LEEDS

### *Moynihan Lecture*

The first lecture of the series endowed by the late Lord Moynihan of Leeds in memory of his mother will be delivered at 3 p.m. on Wednesday, October 2, in the Riley-Smith Hall of the Leeds University Union by Surgeon Rear-Admiral Gordon Gordon-Taylor, F.R.C.S., under the title of "The Moynihan Tradition." Members of the medical profession are cordially invited to attend.

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J. Zahorsky (*Arch. Pediat.*, 1940, **37**, 405) maintains that the disease which he was the first to describe in 1901 under the name of "roseola infantilis" is a distinct entity, and not, as Rietschel declares, merely an allergic reaction due to influenza. He deprecates the term "exanthema subitum" proposed by Veeder and Hempelmann, as the appearance of the rash is not unexpected by the paediatrician. Although hundreds of sporadic cases have been seen, the disease is mildly contagious, though the source of the contagion (bacteria or virus) is not yet known.

# The Services

## CASUALTIES IN THE MEDICAL SERVICES

### ROYAL NAVY

*Missing*

Temporary Surgeon Lieut. James Frederick Newman, R.N.V.R.
Temporary Surgeon Lieut. Arthur Charles Shelford, R.N.V.R.

### ROYAL ARMY MEDICAL CORPS

Lieut. CECIL EDWARD HURLEY, R.A.M.C., was reported as having died in a casualty list published on September 13. He graduated M.B., B.Ch., B.A.O. of the National University of Ireland in 1925 and before the war was in practice at Hull.

*Wounded*

Major Thomas Elliot Elliot, R.A.M.C.
Lieut. Frank Geoffrey Hibbert, R.A.M.C.

*Prisoner of War*

Captain (War Substantive) Percy Bailes Barker, R.A.M.C.

*Prisoner of War and Wounded*

Lieut. William Cecil Harris, R.A.M.C.

## DEATHS IN THE SERVICES

Colonel BASIL FENTON WINGATE, D.S.O., late R.A.M.C., died suddenly in London on September 3. He was born on July 16, 1875, was educated at St. Mary's Hospital, and took the M.R.C.S., L.R.C.P. in 1899. Entering the R.A.M.C. as lieutenant in 1899, he became lieutenant-colonel in 1917, and retired with the rank of colonel in 1928. He served throughout the South African War in 1900–2, when he took part in the relief of Kimberley and in operations in the Orange Free State and Transvaal, including the actions of Paardeberg, Poplar Grove, Dreifontein, Vet River, Zand River, Diamond Hill, Pretoria, and Belfast, and received the Queen's medal with five clasps and the King's medal with two clasps. He also served throughout the war of 1914–18, in the latter part of which he acted as A.D.M.S. of the 20th Division in France with the temporary rank of colonel, was thrice mentioned in dispatches, and received the D.S.O.

Colonel REGINALD JOSCELYN WINDLE, late R.A.M.C., died in a nursing home at Bournemouth on September 6, aged 80. He was born at Derby on August 18, 1860, and was educated at Trinity College, Dublin, where he graduated M.B., B.Ch. in 1884. Entering the army as surgeon in 1886, he became lieutenant-colonel after twenty years' service, colonel in the long war promotion list of March 1, 1915, and retired in 1917. He filled the post of physician and surgeon to the Royal Hospital for Invalid Soldiers at Kilmainham, Dublin, from 1907 to 1912. He served throughout the war of 1914–18. He leaves a widow.

Major LESLIE RAWES, R.A.M.C., T.A., died after an operation on September 12. He was the second son of the late Mr. James Rawes of Lisbon, and was educated at St. Thomas's Hospital and took the M.R.C.S., L.R.C.P. in 1905. After qualifying he filled the posts of house-surgeon to the Royal Northern Hospital and of resident medical officer to the Royal Waterloo Hospital for Women and Children. While in practice in London he was anaesthetist to the Orthopaedic Hospital at Shepherd's Bush and to the Central London Throat, Nose, and Ear Hospital. During the war of 1914–18 he served with the 84th Field Hospital in France and Flanders. He leaves a widow. He was a past president of the Chelsea Clinical Society and had been a member of the British Medical Association for thirty-one years.

Captain FRANCIS MURRAY HALLEY, R.A.M.C., died in hospital at Colombo after a short illness on June 10. He was the son of the late John Halley of the Inland Revenue, Somerset House, and was educated at the University of Edinburgh, where he graduated M.B., Ch.B. in 1915. He also took the D.T.M. & H. of the London Colleges in 1925. He served for some years in the Iraqi Health Service, and afterwards in the Malayan Medical Service under the Agricultural Board. He had been a member of the British Medical Association since 1921.

# Medical News

The New York correspondent of the *Times* cabled last week that more than 1,500 men and women in that city had already given a pint each of their blood for making blood plasma, which was being sent to England for the treatment in the London area of sufferers from shock and for general use in surgery.

The American Red Cross Society has ordered for immediate shipment from New York warehouses 500,000 garments for London people rendered homeless through the air raids. It is prepared to send medical supplies for 10,000 hospital beds. On Tuesday of last week the society cabled funds for the purchase in London of twelve mobile canteen units of eight vehicles each for the feeding of civilians.

A cheque for £62,393 has been received by the London Hospital from the estate of the late Dr. Alexander G. Mercer, of Rhode Island, U.S.A., representing the sum of $252,229. Under his will, dated 1870, there were three annuitants, and the last of them having died the estate has become distributable.

Owing to the generosity of Dr. A. A. Brill special equipment has been obtained for the Freud Memorial Room, which forms part of the library of the New York State Psychiatric Institute and Hospital. This room has been established for the filing of psycho-analytic works, the nucleus of which is part of Freud's personal library.

The Medical Sickness Annuity and Life Assurance Society, Limited, announces that the society's records were removed at the beginning of the war to "Highfield," Chesterton, Cirencester, where the normal work has been carried on. Only a skeleton staff has been working in London to deal with new business.

The August issue of the *Irish Journal of Medical Science* contains the report of the Rotunda Hospital, Dublin, for the period November 1, 1938–October 31, 1939.

The July issue of the *Archives of Pathology* is dedicated to Dr. S. Burt Wolbach Shattuck, professor of pathological anatomy in the Harvard Medical School.

St. Dunstan's, the institution for blinded sailors, soldiers, and airmen in Regent's Park, was a product of the last war, and in the present war eye casualties have the experience and tradition of St. Dunstan's at their service. The twenty-fifth annual report describes the cases of the first war-blinded men in 1939 who are being assisted. Towards the end of 1938 St. Dunstan's completed a convalescent home on the Sussex Downs to which last year a most up-to-date operating theatre wing was added as the gift of Lord Nuffield. This home is now serving as a war hospital for the blinded, the partially and temporarily blinded, and the doubtful cases. St. Dunstan's is helping all who lose their sight in the country's service wherever they may be living in the United Kingdom or the Empire, but Scotsmen at a later stage will go for training and rehabilitation to Newington House, Edinburgh, the Scottish national institution for blinded sailors and soldiers. On the request of the Minister of Health St. Dunstan's has also agreed to take in any civilian cases that may arise as the result of air raids or cases from the fishing fleets or the merchant service.

Attention is drawn by the Home Office to the Poisons (Amendment) (No. 2) Rules, 1940, which came into operation on August 26 as provisional rules in England and as statutory rules in Scotland. The rules add to the sales exempted from the prohibition on the sale of strychnine contained in Rule 15 of the Poisons Rules, 1935, sales to a person producing a written authority in the prescribed form authorizing the purchase of strychnine for killing moles. A person to whom strychnine is sold for this purpose may not use it for any other purpose and must take proper precautions for preventing access to it by other animals.

The Académie des Sciences of Paris has awarded the Montyon Prize to Dr. Constantin Levaditi of the Institut Pasteur.

The University of Berne has awarded the first international prize on the subject of encephalitis to the Italian neurologist Dr. Beppno Disertori.

Dr. Gordon Berry of Worcester, Mass., has been elected president of the American Laryngological Association.

An institute for haematology and blood transfusion has been founded in Madrid. During the recent civil war more than 20,000 transfusions with fresh and preserved blood were performed.

According to the statistical office of Buenos Aires 25% of the deaths occurring in that city are caused by pulmonary tuberculosis, while cancer comes next (15.07%).

# Medical Notes in Parliament

Mr. Churchill stated in the House of Commons on September 17 that during the first half of September about 2,000 civilians had been killed and 8,000 wounded in Great Britain by enemy action. Of these casualties about four-fifths had been in London. Only 250 casualties had been suffered in the fighting Forces. The House then went into Secret Session and the debate on physical education arranged for that day was postponed.

### Feeding of the A.T.S.

Mr. EDEN announced on September 17 that the normal type of soldier's ration having proved too heavy for women in some respects and deficient for women in other respects a new scale was being introduced more appropriate to the needs of the Auxiliary Territorial Service. The main changes were: (*a*) A slight reduction in the heavier foods such as meat, bacon, and bread. (*b*) A supplementary ration of eggs, 50% extra milk, fruit (fresh when possible), and a higher scale of fresh vegetables. (*c*) The supply of a breakfast cereal, a cup of chocolate, and other minor variations of the same kind.

The general purpose of these and other changes, he said, was to provide more fully for the health and welfare of all branches of the Auxiliary Territorial Service.

### Enteric Fevers in the Army

The number of cases and deaths from the enteric fever group of diseases recorded in 1938 at home stations and in India, and in 1939 at home stations, are:

| | 1938 | | 1939 | |
|---|---|---|---|---|
| | Cases | Deaths | Cases | Deaths |
| *Home Stations:* | | | | |
| Typhoid fever .. | — | — | — | — |
| Paratyphoid fever.. | 1 | — | 13 | — |
| Enteric group .. | — | — | — | — |
| *India:* | | | | |
| Typhoid fever .. | 15 | 3 | Not available. Report from India not yet received. | |
| Paratyphoid fever.. | 6 | — | | |
| Enteric group .. | 16 | 2 | | |
| Totals (India) .. | 37 | 5 | — | — |

*X-ray Facilities in Naval Hospitals.*—All Royal Naval hospitals are fitted with *x*-ray apparatus, and portable sets are carried in all cruisers and larger vessels. These naval facilities are used for diagnosis. In giving this information, on September 11, Mr. ALEXANDER added that satisfactory and adequate provision is made for the few cases requiring treatment by sending them to civil hospitals.

*Ear Protection for Naval Personnel.*—In the Navy, ear defenders are already supplied to men exposed to gun blast. A standardized defender will shortly be issued to all personnel. Advice has been given in Admiralty Orders on various methods of protecting the ears against blast.

# Letters, Notes, and Answers

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## QUERIES AND ANSWERS

### Defect of Micturition

Dr. F. O. TAYLOR writes in reply to " Puzzled " (August 31, p. 306): The " last few drops " are probably only a part of a residual quantity of urine which is being unconsciously accumulated through loss of tone. If no obstructive cause can be found it is possible that the trouble began through a daily effort not to pass water over a long " inconvenient " period. It is well known how difficult it is to break off the act of micturition before the feeling of completion comes. Careful passing of a catheter after the apparent emptying of the bladder will prove this. Sedative treatment is merely " throwing up the sponge," and will eventually aggravate the condition.

### Cramp of the Leg

Dr. H. W. NOTT (Guildford) writes: In the *Journal* Dr. Alexander Francis (May 4, p. 755) stated that cramp of the leg could be almost instantly stopped by pinching with the finger and thumb in front of the tendo Achillis just above the ankle. It may be of interest, therefore, to record that this suggestion has proved of much use to an elderly man who had been subject to frequent attacks of nocturnal cramp for many years. After testing the method for four months he finds that it acts better in his case the sooner it is applied after the cramp sets in. For example, when the onset occurs before sleep, or at a time when he can quickly bring his foot within reach of his hand, he finds the spasm will often die away in a few seconds with a delightful sense of relief. But when it occurs during sleep and he is late in applying the remedy he finds it less successful, as the pain and spasm take longer to control. In fact, the one occasion on which this method entirely failed was when he slowly awoke from a very deep sleep and when the muscles of the calf were already in full contraction. With this exception he says the method has brought him more natural sleep of late than he has had for a very long time, and has left him fitter to meet the loss of sleep that now results from air raids.

### Serrated Foot-piece for Thomas Splint

" LEWES " writes: We are having continual arguments on the question of the correct use of the serrated foot-piece in relation to the Thomas splint illustrated in *R.A.M.C. Training Manual*, 1935.

*** The serrated wooden foot-piece was designed by Major Meurice Sinclair during the last war, and its use is well illustrated in his book *The Thomas Splint and its Modifications*, which was published in 1927 by the Oxford University Press. The serrations seem to puzzle many people nowadays. They are used to keep in place flannel extension strips fastened to the sole and dorsum of the foot by Sinclair's glue, or similarly to fasten pieces of adhesive strapping applied in the same way. Though skeletal traction has largely replaced skin traction, Sinclair's own reference to this foot-piece and its application is valuable to those who follow his practice.

### Questions about Drowning

" HOVE " writes: I have lately consulted various textbooks for details about drowning, but have not been successful in finding what I want. Perhaps some of your readers can help me. (1) Is it true that one sometimes gets spasm of the glottis so that practically no water enters the lung? If so, it will explain resuscitation after long periods of immersion. But has such a condition ever been found post mortem or are cases found after death by drowning with practically no water in the lung? (2) What is the average duration of immersion after which (apart from freak cases) resuscitation is not likely to take place? It would seem that several minutes only is the usual time. (3) What are the chances of complications, especially pneumonia, after immersion of several minutes? It seems extremely likely that such will take place; the delicate membrane of the lung was never meant to come in contact with water and certainly not with muddy water. I have recently seen a post-mortem examination of a muscular young man who died by drowning, upon whom artificial respiration had been performed for the regulation time. The lungs were so full of moisture that the hopelessness of Schäfer's method was apparent (or perhaps any method). It would appear that some method such as Sylvester's with the body tilted strongly towards the head would offer more chance of success. The popular idea of the success of artificial respiration unless the patient has been in the water a very short time seems anything but correct.

## LETTERS, NOTES, ETC.

### Public Health, Hospital, and Small Classified Advertisements

Hitherto the Advertisement Manager has been able to include these in the current issue provided they arrived not later than first post Wednesday morning. The printers are now working under great difficulties, and the hours of work are less through air raids and by the stoppage of night shifts. It is therefore very necessary that an advertisement should reach this office not later than first post *Tuesday morning* for inclusion in the issue that goes to press the same week.

### Deaf Aids in Air Raids

" W. M. M. J." writes to draw attention to the urgent need for removing powerful deaf aids from the ears during air raids. Serious injury would, he says, certainly result should a bomb explode near the ear. To switch off the current would of course serve the same purpose.

### Acute Adenitis treated with Sulphapyridine

Dr. MARY BARTON (Morden) writes: The following case history may be of interest in view of the present attempts to gauge the full extent of usefulness of the sulphonamide group of drugs. I was called recently to visit a boy aged 7 years, the eldest of a family of four, whom his mother believed to be suffering from mumps. The patient had had a feverish cold six days previously, and four days later his mother first noticed a swelling on the right side of the neck just below his chin. When I examined him his temperature was 102° F. with a correspondingly rapid pulse, and the right submaxillary gland was hard and swollen to the size of a tangerine. Examination of the mouth, teeth, fauces, and chest revealed nothing abnormal, and the child denied having at any time noticed any soreness of the throat or mouth. Three-hourly poultices to the swelling with cataplasma kaolin were ordered, which his mother faithfully carried out for a further three days, after which I saw him again. The swelling was then larger, less defined, and more tender, the temperature was 101°, and though the child's general condition had not deteriorated I came to the conclusion that a deep abscess was forming on the posterior aspect of the gland. A surgeon, Mr. J. A. White, who saw the child on the same day, agreed with this diagnosis, and arranged to admit him to hospital when the abscess was ready for opening. On this day I began treatment with M & B 693 (sulphapyridine), 0.25 gramme t.d.s., and this was almost immediately attended by a most startling improvement. Forty-eight hours later the patient's temperature was normal, the gland was reduced to the size of a walnut, was movable and no longer tender, and all surrounding inflammatory infiltration of the tissues had disappeared. I stopped administration of the drug at this juncture. Two days later the left submaxillary gland swelled up with great rapidity, and the boy's temperature rose to 99.6°. Treatment with sulphapyridine in the same dosage as before was recommenced, and after forty-eight hours again both glands were barely palpable and the temperature was normal. The child made a complete and uninterrupted recovery. None of the three other children has shown any signs of developing mumps, the full incubation period having elapsed, and presumably, therefore, the patient was not suffering from this disease. In view of the remarkably quick response to treatment with sulphapyridine I assume the likelihood is that this was a case of pneumococcal adenitis.

### A Psychiatric Department Suspends Work

The Chief Officer of the Maudsley Hospital writes: Out-patient departments for psychiatric patients of both sexes and for children exhibiting conduct disorder have been carried on at the Maudsley Hospital, Denmark Hill, since the outbreak of war in September of last year. The recent intensification of air raids on London has interrupted the attendance of patients and has added to the difficulty of providing medical attention. It has been decided, therefore, to suspend the out-patient sessions at the Maudsley Hospital temporarily. Further notice will be given of resumption.